

Business model analysis, an essential management tool



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Introduction

*The top priority in European banking supervision
is business models and profitability*
Danièle Nouy¹



The last few years have seen a growing interest in analyzing the business models of financial institutions from all angles: regulators and supervisors show concern about the viability and sustainability of financial institutions, financial institutions review their own business models, and the academic world is giving more and more attention to this matter. While this was already a matter of concern in all these areas (see Llewellyn (1999))², it was the various collapses caused by the financial crisis that spurred interest in this topic.

This is currently in addition to the unprecedented transformation that financial institutions are experiencing in their business models: profitability is threatened by interest rates, macroeconomic uncertainty and the entry of new competitors; regulation, partly as a result of the financial crisis, makes increasingly demanding requirements in all areas of banking activity; and today's more sophisticated technology and savvy customers are putting a big question mark on banks' traditional way of doing business.

In more detail, some of the main factors defining the environment in which financial institutions have been operating in recent years are:

- ▶ A **macroeconomic environment** in which higher growth coexists with some risks and uncertainties, which in the main developed economies is reflected in sustained but moderate GDP growth levels, private sector deleveraging, a prolonged period of low inflation and interest rates at historical lows, and an improvement in unemployment that partly helps to contain default levels. Added to this is the changing growth pattern of some of the world's major economies (e.g. China, Russia and Brazil).
- ▶ A **regulatory environment** that is increasingly demanding and complex in all areas: (i) capital and provisions (Basel III³; changes to the regulatory capital calculation methods for key risks, requirements on the balance sheet structure (TLAC, MREL⁴); capital planning, ICAAP and ILAAP, stress testing, IAS 39 and IFRS 9 in loan provisions); (ii) information and reporting (BCBS239, FINREP, COREP, STE, AnaCredit, AQR, Asset Encumbrance, EMIR, FATCA, New ECB Data Framework, etc.); and (iii) other requirements (conduct, compliance, model risk management, ring fencing, corporate governance and resolution plans, etc.). This coincides in time with a supervisory process in the area of transformation, marked in Europe by the creation of the

Single Supervisory Mechanism (SSM⁵) and the Supervisory Review and Evaluation Process (SREP), which harmonizes and raises the bar in banking supervision.

- ▶ An unprecedented **technological transformation**, characterized by an exponential increase in the ability to generate, access, store, process and model information⁶. This in turn leads to changes in customer behavior, particularly in the use of digital channels and social networks, and to the emergence of new non-bank competitors, including a significant number of non-regulated financial intermediaries (shadow banks) and technology-intense companies with new business models (fintechs).

All this puts increasing pressure on profitability, mainly as a result of lower interest rates. According to the Fed⁷, banks' financial margins have declined by more than 100 bps since 2000, 70 of them in the last 5 years, both for assets (narrower margin on loans, but also on securities and other assets) and for liabilities (regulatory requirements on the financing structure and reluctance to applying negative rates to deposits, making it difficult to take advantage of the low interest rate environment⁸).

¹ECB (2016).

²Llewellyn, D.T. (1999).

³Adopted in Europe through CRD IV and CRR.

⁴Total loss-absorbing capacity (TLAC) and Minimum requirement for own funds and eligible liabilities (MREL), FSB and EBA requirements on the minimum proportion of loss-absorbing liabilities banks need to deal with a resolution scenario.

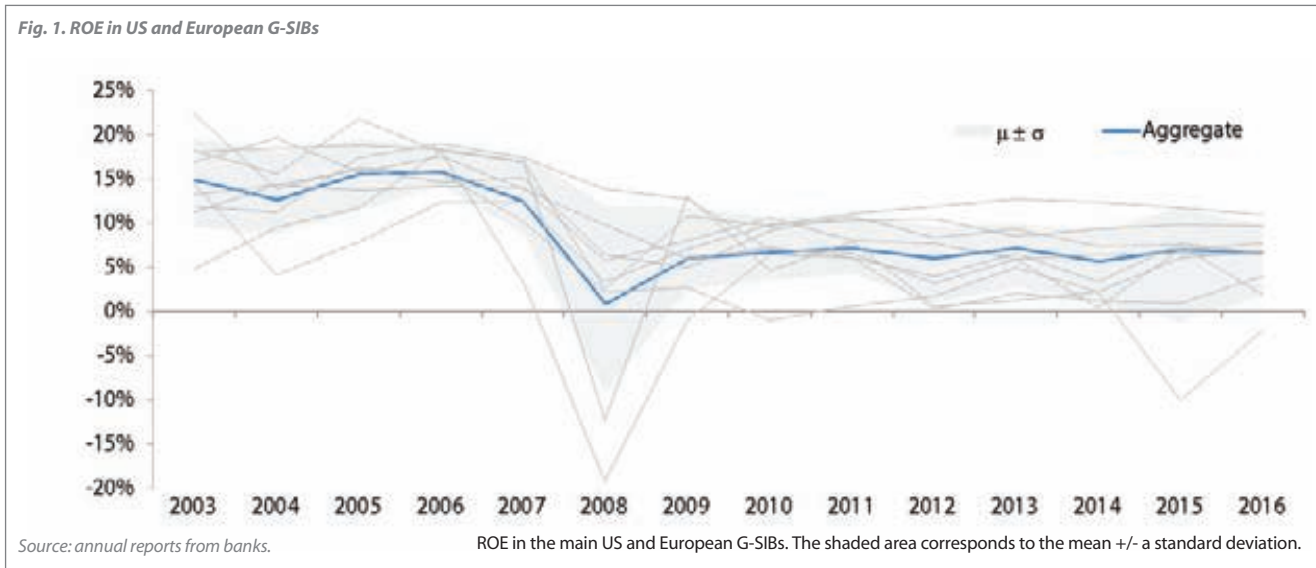
⁵Single Supervisory Mechanism. Comprises the ECB and the national banking supervisors of the participating euro area Member States.

⁶Management Solutions (2015): *Data science and financial industry transformation*.

⁷Fed (2015).

⁸ECB (2016).





To some extent, this landscape has come about as a result of the financial crisis that started in 2007, which has significantly reduced bank profitability: ROE levels, which were often above 15% before the crisis, are now close to the cost of capital (often even below it) in the economies with the highest banking penetration levels⁹ (Fig. 1).

As a result, there is explicit concern on the part of entities, regulators and supervisors about the insufficiency of these ROE levels to meet costs. In the words of Danièle Nouy¹⁰:

The return on equity realised by banks in the euro area is still well below their costs of equity.

This concern about profitability does not have an obvious solution: banks try a combination of cost reduction, both in the more traditional approach (branches, sizing) and in a more disruptive one (digitization), with revenue increases (pricing, fees and commissions).

In this context, business model analysis (BMA) is all the more relevant and, within it, so is business risk or strategic risk management, defined as¹¹:

The current or prospective risk to earnings and capital arising from changes in the business environment and from adverse business decisions, improper implementation of decisions or lack of responsiveness to changes in the business environment.

Business risk, thus understood, is receiving considerable attention from regulators and supervisors:

- ▶ The ECB places it as a top supervision priority¹², and in SREP it effectively devotes one of its four blocks of analysis to assessing the business model, on the same level as the assessment of risk governance and risk, capital and liquidity management.
- ▶ For the first time, the EBA publishes a guide¹³ that explains how it should be monitored, and introduces business model analysis (BMA) as a supervisory tool to determine business model viability (for the following 12 months), sustainability (for the following 3 years) and key business model vulnerabilities for each supervised financial institution.





- ▶ The Fed uses the business model as a fundamental basis for determining the depth and type of supervision¹⁴ and, for the CCAR¹⁵ exercise, requires detailed projections of income and expenses as well as an explanation of expected changes in the financial institution's business model.

Moreover, there is increasing concern about the potentially systemic nature of business risk, since¹⁶:

Low profitability is obviously a major concern for the stockholders of banks. And it is also a concern for supervisors. Over the long term, low profitability threatens the ability of banks to generate capital and access financial markets. Ultimately, a lack of profitability affects the stability of banks.

Against this backdrop, this paper aims to provide a detailed and comprehensive view of the supervisors' analysis of the business model. The document is structured in three sections with three objectives:

- ▶ Describe the new banking business environment by analyzing the macroeconomic, regulatory and technological context, describing the key components underlying banks' changing profitability.
- ▶ Explain the Business Model Analysis (BMA) concept as well as different supervisory approaches to it, with a special emphasis on the European Union.
- ▶ Summarize the industry's response to the BMA supervisor, focusing on the different tools and metrics used by banks for business model analysis purposes.



⁹Economies with banking penetration experienced significantly lower ROE reductions.

¹⁰ECB (2016).

¹¹EBA/CEBS (2004).

¹²ECB (2016).

¹³EBA (2014).

¹⁴Fed (2014).

¹⁵Fed (2016).

¹⁶ECB (2016).

Executive summary

*There are costs and risks to a program of action.
But they are far less than the long-range risks and
costs of comfortable inaction*
John F. Kennedy¹⁷



This section summarizes the main conclusions reached on the context, developments and regulation surrounding the analysis of financial institutions' business models, which will be elaborated on in the following sections of this document.

The new banking business environment

1. The banking business is immersed in a process of deep transformation driven by at least three major factors: (i) macroeconomic environment, (ii) regulation and supervision, and (iii) digital transformation, which is having a direct impact on banks' profitability: reduced margins, pressure on costs and lower ROE. According to the EBA, 30% of European financial institutions expect to make changes to their business model as a result of these factors.
2. The **global macroeconomic trend** is for moderate growth in a low inflation and low interest rate environment, though with decreasing unemployment and NPL rates, which in the short term has allowed banks to maintain the price of assets and rekindle risk appetite, but in the medium term reduces the profitability of the banking business and makes it more vulnerable.
3. As for the **regulatory and supervisory context**, requirements are more numerous, more demanding and affect more areas (capital, provisions, balance sheet structure, liquidity, leverage, etc.), in return for greater security and solvency for the whole system, which hinders banks' profitability at the structural level; and the direct costs of adapting to requirements are being very significant for financial institutions, reaching 2,000 million dollars per year in the case of the largest banks^{18,19}. However, the expectation is for some stabilization in the medium term as the process of regulatory and supervisory transformation concludes.
4. Also, in relation to **digital transformation**, there is an unprecedented technological revolution with a profound impact on the business model of banks. This transformation can be synthesized into three changes: (i) an exponential increase in data and data storage, processing and modeling capabilities, with lower associated costs; (ii) a change in customer behavior towards a more digital and informed profile; (iii) the emergence of new competitors that are heavily leveraged on technology.
5. Faced with the challenge posed by the transformation of the environment in which they operate, financial institutions are responding by transforming their own organizations in at least four areas:
 - **Business**, by improving segmentation techniques (clusterization) and marketing systems for each segment (focused on customer engagement and retention), redesigning distribution models (with greater emphasis on omnichannel and more efficient use of branch office networks) and above all providing

a better customer experience (redesigning customer journeys and focusing on service quality).

- **Transformation and efficiency**, by creating structures that lead to improved governance of data and models, incorporating information security into the CEO's agenda, introducing digital components into business and support processes, simplifying processes, implementing profitability improvement programs, creating shared service centers, etc.
- **Finance**, by reviewing financial information frameworks, developing budgeting models (through refined PPNR²⁰ techniques), improving information on costs (and its use in pricing), increasing the frequency and granularity of liquidity information, fine-tuning capital planning (stress scenarios, capital optimization, etc.) and adjusting the calculation of capital and provisions based on internal models.
- **Risks**, by promoting a sound risk culture, reviewing the risk reporting frameworks, working towards integrated risk management (through defining the risk appetite and transferring it to a structure of limits), evolving the internal models (machine learning), automating the risk origination and follow-up processes, and developing the management and control of non-financial risks (operational, conduct and compliance, etc.).

The supervisory approach: Business Model Analysis (BMA)

6. In response to the pressure these factors put on banks' profitability, supervisory authorities are reinforcing the review of the business or strategic risk faced by institutions through the use of Business Model Analysis (BMA), making it a top priority for supervision.
7. BMA has taken on a more specific form in the European Union, acquiring a distinct name and methodology, being ranked as a priority and becoming part of the SREP bank supervision process. Specifically, the EBA has reformulated business model analysis to gear it towards evaluating the viability and sustainability of financial institutions, as well as identifying their main vulnerabilities, and in the euro area the ECB is implementing it as the banking supervisor.

¹⁷ John Fitzgerald Kennedy (1917-1963), 35.^o President of the United States.

¹⁸ FFA (2015).

¹⁹ IIF (2015).

²⁰ Pre-provision net revenues; income statement projection models.

8. Thus, this analysis has been ranked at the same level as the assessment of banks' governance and control over the different types of risk and of liquidity, integrating it in the supervisory scoring decisions through the use of tools and procedures such as top-down, bottom-up and prospective analysis.
9. The approach proposed by the EBA (and implemented by the ECB as the supervisor) has ten stages: (i) preliminary assessment; (ii) identification of relevant areas; (iii) analysis of the business environment; (iv) quantitative analysis of the current business model; (v) qualitative analysis of the current business model; (vi) analysis of strategy and business plans; (vii) business model viability evaluation; (viii) strategy sustainability evaluation; (ix) identification of vulnerabilities; and, last, (x) summary of results and scoring.
10. The treatment adopted by supervisors in other geographies has some common elements, but focuses on different aspects: in the UK, where the reference standard to date has come from the EBA, the PRA follows a similar approach to that of the ECB, although with a greater focus on analysis under stress scenarios, while the FCA focuses on the aspects of integrity, market competition and consumer protection; and in the United States, the supervisory program has been geared to analyzing business models, profitability and strategy, and the Fed, the OCC and other supervisors have developed the CAMELS rating, which evaluates six components (capital adequacy, quality of assets, management, income, liquidity and sensitivity to market risk) in the business model of financial institutions.

Business model analysis tools

11. In the European Union, banks have received the EBA's BMA proposal with different levels of acceptance. Responses from the main banking associations generally recognize the need for the supervisor to conduct a BMA, but they question or oppose the idea of assigning a quantitative score to rate the business model of financial institutions, they are concerned about the supervisor potentially interfering in their business decisions, and consequently propose that the BMA be merely informative and does not give the supervisor the possibility to intervene in the bank's strategy.
12. Beyond the industry's responses, each bank is individually adapting to the BMA requirements. To this end, banks are focusing mainly on four aspects: (i) conducting BMA self-assessment exercises, aimed at anticipating the supervisory response; (ii) reviewing their strategic planning methodology to make it more robust, more analytical and better documented; (iii) improving documentation and internal reporting with an impact on BMA (capital planning, liquidity reporting, internal risk reporting, recovery and resolution plans, etc.); and (iv) developing quantitative tools for BMA.
13. Most banks are therefore approaching BMA from different angles which are not necessarily coordinated or consistent, and are largely focused on responding to the requirements of regulators and supervisors. As a result, there is no enterprise-wide view of all critical business components that permanently questions the bank's business model from a strategic point of view.





14. This enterprise-wide view should take the form of a systematic framework for analyzing and monitoring the business model — with the participation of the different areas involved (Planning, Risks, Capital, Financial Management, Strategy, etc.), that uses quantitative techniques in addition to expert judgment for measuring and projecting key components.
15. These techniques could include, but are not limited to: (i) qualitative scenario analysis for decision-making (quantifying impact on results, capital and liquidity), from an enterprise-wide perspective and linked to the risk identification and assessment (RIA) regulatory process; (ii) RAROC analysis to ensure that the price of transactions covers all costs, as a mechanism to assess and ensure the viability of the business; (iii) efficiency analysis, based on the cost-to-income ratio and detailed analysis of its components, as a mechanism to ensure business viability; (iv) digitization, through analysis of the level of product development, technological adaptation and strategic positioning in the digital area, for which there are still no consistent, comparable and commonly accepted metrics; (v) PPNR modeling, which provides a forward-looking view of the income statement under different scenarios; and (vi) quantification of the bank's concentration levels as a vulnerability, in individual terms but also in geographical and industry terms.
16. There are, however, challenges in the use of BMA-related quantitative tools, mostly to do with treating data governance, models and IT architecture as a top priority for the organization, and also with having a corporate framework in place that will integrate all tools, seeking the greatest common factor in terms of tool uses in the different areas to ensure there is basic consistency when applying each tool to the specifics of each area, but the challenges are also about identifying and storing information for these tools, defining scenarios, striking a balance between statistical methods and expert judgment, determining the need and, where appropriate, the methodology for calculating capital for business risk, designing and implementing scorecards, and integrating these tools into effective business management processes, beyond compliance with regulatory and supervisory requirements.
17. In short, BMA means constantly questioning one's own business model to identify vulnerabilities and to anticipate, compare and, where appropriate, implement effective solutions, which in the current context of exponential change becomes even more relevant. And in this context, BMA is not just another tool, it is a critical element to ensure the survival of banks, which, in many cases, have yet to finish developing and embedding this tool in their management systems.

The new banking business environment

A number of reasons have been mooted as the causes of this low profitability, including low interest rates. Long-term real interest rates have been falling in the major advanced economies for two decades. Technological change, demographics, income inequality and safe asset scarcity are just a few of the factors exerting downward pressure on long-term real rates.

Mario Draghi²¹



The environment in which financial institutions operate has been undergoing substantial transformation in recent years. According to the Financial Stability Board (FSB)²² and BCBS²³, some changes are a direct consequence of the deterioration of the economic environment and its weak recovery since the financial crisis that began in 2007 (which has resulted in the deterioration of financial institutions' balance sheets and income statements), while, as pointed out by the European Central Bank (ECB)²⁴, other changes stem from the technological revolution and socio-economic transformation²⁵. Although both types of changes have coincided in time, their nature is different: in the first case there is an underlying cyclical nature caused by economies' performance, while the second case has to do with a revolution of a disruptive nature.

In addition, there has been a thorough review of regulation and an increase in supervision, incorporating new aspects that were partially or totally beyond the scope of both activities, such as overseeing the viability and sustainability of banks as part of the risk supervision framework, which will be discussed in further detail in this paper.

Furthermore, industry globalization and changing consumer patterns represent a challenge for banks when it comes to adapting their product and service offer, in terms of both growing demands for customization and the emergence of new players and competitors²⁶ that are transforming the competitive landscape.

These factors have had a negative effect on bank margins, significantly affecting efficiency, as a result of both cost rigidity and the emergence of new digital transformation and regulatory compliance related costs, which has had a significant impact on banks' ROE (Fig. 2).

According to the IMF²⁷:

- ▶ The increase in capital requirements has resulted in banks' ROE falling from more than 15% to around 4% in large European banks; and to a lesser extent, from 12% to 9% in the United States.
- ▶ Lower interest rates, as well as fewer loans being granted due to worse market conditions, have contributed to reducing banks' interest income and net interest margin. On the other hand, there has been an increase in provisions due to the poor credit quality of the loan portfolio, which has a direct impact on net profit (lessened in recent years by an improvement in NPL ratios).
- ▶ Growing competition, from non-banks as well as from other banks, puts pressure on prices and squeezes margins due to the less flexible nature of banks' fixed costs compared to their income levels, despite the fact that both European and US financial institutions have reduced their costs by 30% - 35% compared to the average for 2006-2007.

The impact of these factors on profitability has been reflected in the price valuation of listed financial institutions, making the average price-to-book²⁸ ratio below one, with particularly low values for European institutions²⁹.

As a result, and to adapt to the new environment resulting from the aforementioned changes, financial institutions have strengthened their business model through creating new roles and functions, reorganizing structures and processes, and incorporating new risks within the institution's management framework, among other measures. In fact, as of June 2016 more than 30% of banks under the EBA review scope expected to make substantial changes to their business model going forward³⁰.

²¹ECB (2016c).

²²FSB (2015).

²³BCBS (2014).

²⁴ECB (2016b).

²⁵Also discussed by the private sector, such as in Citi GDP (2016).

²⁶BBVA Research (2015).

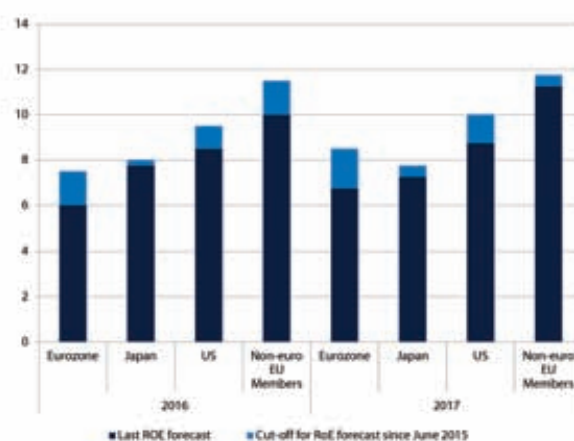
²⁷IMF (2016a).

²⁸Price-to-book: $\text{Number of shares} \times \text{share price} / \text{book value}$.

²⁹IMF (2016).

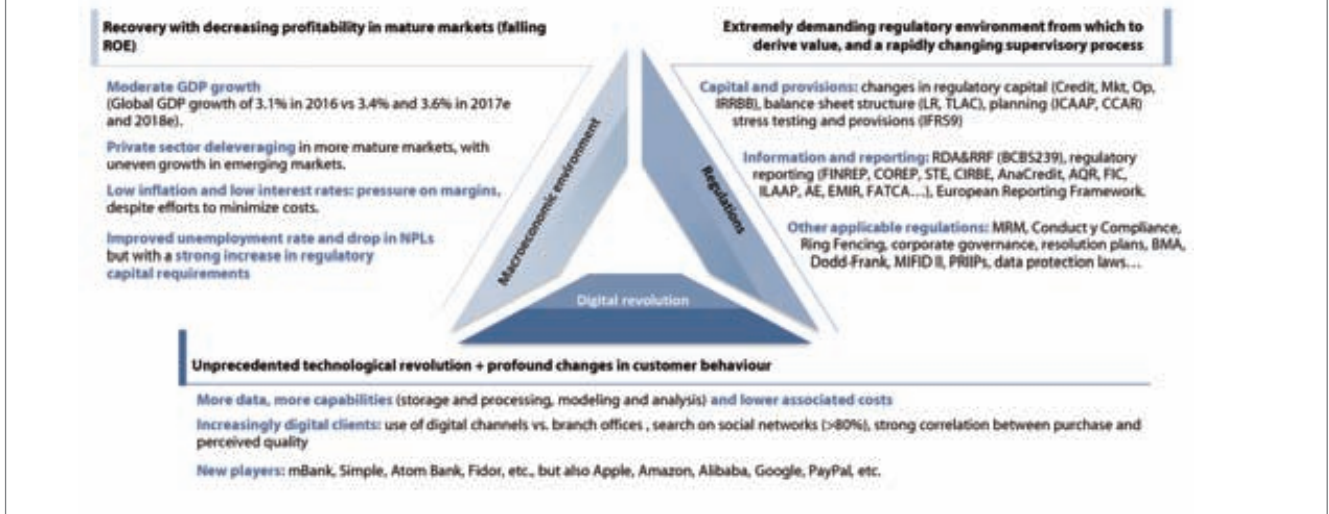
³⁰IMF (2016a).

Fig. 2. RoE forecast for 2016 and 2017 by region



Source: ECB (2016).

Fig. 3. Three sources of bank transformation



In order to reflect on the new landscape and its impact on the banking sector, this section provides a brief analysis of the three main elements that are determining change in financial institutions (Fig. 3): the macroeconomic environment, existing regulations and the digital transformation of banks, their customers and their competitors.

Macroeconomic environment

In recent years, economic growth has been moderate and economic policy, especially monetary policy, has played a very active role in managing the financial crisis, and has exhausted the scope of traditional monetary policy instruments^{31,32}. However, growth expectations, especially in developed countries, raise the question of whether in the medium term, the economy faces moderate growth scenarios with no room for expansionary economic policies. According to the US Treasury Secretary³³:

The nature of macroeconomics has changed dramatically in the last seven years. Now, instead of being concerned with minor adjustments to stabilize about a given trend, concern is focused on avoiding secular stagnation. Much of this concern arises from the longrun effects of short-run developments and the inability of monetary policy to accomplish much more when interest rates have already reached their lower bound.

Overall, macroeconomic indicators are expected to improve over the next few years, though there is still uncertainty in connection with both the developed and the developing

economies. This behavior can be observed in a concise form by looking at the higher interest rates, GDP, unemployment and NPL levels, as detailed below.

Interest rates

The combination of low growth periods with an expansionary monetary policy by the main central banks has created low inflation expectations for the medium and long term in the financial markets and, as a consequence, the interest rate curve has stayed at levels close to zero and with a moderate slope (Fig. 4).

While the expansionary monetary policy has been effective in the short term, since it has allowed the asset price to be maintained and has rekindled financial institutions' appetite for risk, in the medium term a low interest rate environment reduces the profitability of the banking business, which makes it more vulnerable to external shocks³⁴.



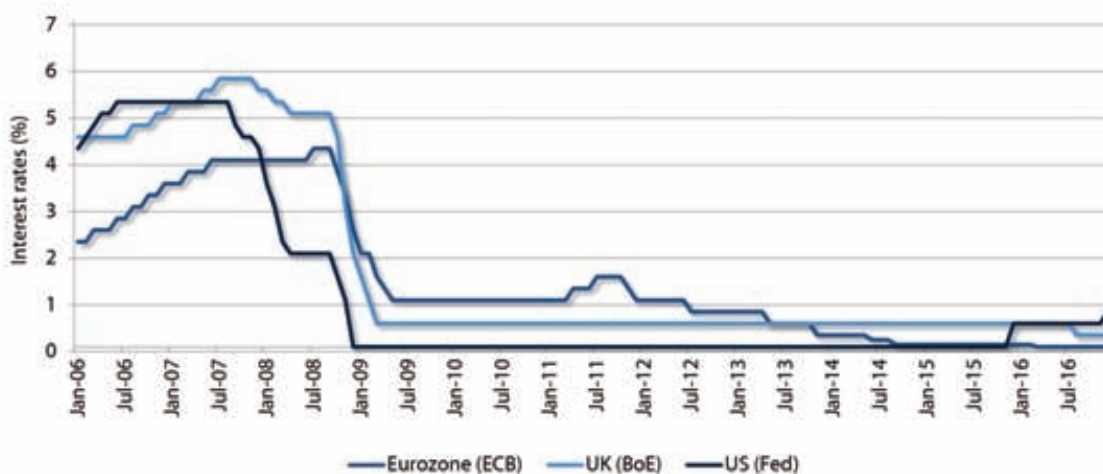
³¹ECB (2016a).

³²Fed (2015a).

³³Summers, L. H. (US Secretary of the Treasury, 2014).

³⁴IMF (2016a).

Fig. 4. Official interest rates in the euro zone, UK and US



Source: ECB, BoS and Fed.

GDP growth

In the last few years, GDP growth rates for the developed economies have been close to 2%, the equilibrium level expected for the coming years³⁵. Likewise, the deleveraging trend that started after the 2007 crisis is still evident, particularly in the private sector.

Emerging markets and developing economies are expected³⁶ to grow by 4.5% in 2017 and 4.8% in 2018. However, there is increasing uncertainty about the solidity of this growth³⁷, due to the lower price of raw materials and the structure of corporate debt, where the balance has tipped towards foreign currency resources, which can create balance sheet mismatches at the aggregate level.

In particular, there are changes in the growth patterns of some of the world's major economies, including China (which is now growing below 7%), Russia (which has hit recession point) or Brazil (which has already gone through several successive periods of recession, although with prospects for recovery).

Unemployment and default

Finally, there is a general improvement in unemployment levels. In the case of advanced economies, unemployment has generally shrunk from its peak value of less than one percentage point above the level recorded in 2007³⁸.

As a result, NPL levels, directly correlated with unemployment, are declining in overall terms, though in the euro area banks still hold a large volume of non-performing loans. As of September 2016, banks directly supervised by the ECB held € 921 billion in problem loans, representing 6.4% of total loans and equivalent to 9% of the Eurozone's GDP, with unequal behavior across countries^{39,40}.

Regulation

In recent years there has been a very significant increase in regulatory pressure which, in exchange for a generally more secure and solvent system, is reducing bank profitability in a structural way. Specifically, as a result of both regulatory changes that are already being implemented and those in the process of being onboarded, banks are facing greater capital requirements (in terms of both quantity and quality), as well as requirements on provisions and liabilities structure, short-term and structural liquidity requirements, limitations on the instruments that can be used to generate return on assets, and potential limitations on dividend distribution. According to the EBA⁴¹, the biggest constraints have to do with banks' leverage capacity and with shareholder profitability.

In addition to the above, banks are experiencing an increase in the direct economic costs derived from complying with these regulations. According to studies by Federal Financial Analytics and the Institute of International Finance, it is estimated that the largest banks have direct regulatory costs of up to \$ 2 billion a year^{42,43}.

However, there are several indications that the regulatory transformation process may be coming to an end, especially as regards key regulatory requirements on capital, liquidity, information and reporting, since most of the changes in these

³⁵IMF (2017).

³⁶Ibid.

³⁷CIEPR (2015).

³⁸IMF (2016).

³⁹The total number of NPL's remains at double-digit figures in six Eurozone countries: Cyprus, Greece, Italy, Ireland, Portugal and Slovenia.

⁴⁰ECB (2017).

⁴¹EBA (2015).

⁴²FFA (2015).

⁴³IIF (2015).

areas have either already entered into force or have been addressed by entities in advance of the deadline. According to Danièle Nouy⁴⁴:

Basel III, the centrepiece of regulatory reform, is about to be finalised in 2016. There will be no significant further increases in capital requirements, and we are not discussing Basel IV. Regulatory reform is coming to an end.

Despite this, there are still some open questions, such as those concerning the capital ratio, the trading book requirements or the review of internal models for credit and operational risk (though the BCBS has anticipated that it does not foresee a significant increase in capital requirements for banks⁴⁵).

Finally, there are other regulatory and supervisory areas to which banks have yet to adapt or in which some degree of regulatory stability has not yet been achieved, such as IFRS 9 provision models, TLAC or MREL implementation, ICAAP and SREP changes, or the implementation of the ECB's TRIM⁴⁶ project and the consequences that will arise from it.

To sum up, regulatory and supervisory requirements are more numerous, more demanding and affect more areas, which erodes banks' profitability in a structural way, and the direct costs of compliance are being very significant for financial institutions, but expectations are for stabilization in the medium term.

Digital transformation

A third element that is determining the transformation of financial institutions is the digital revolution, which can be characterized by three major evolving areas: big data and increased storage and processing capabilities, digitization and changes in customer demand, and the emergence of new players in the financial market⁴⁷.

Big data and capacity building

The last few years have seen further exponential advances in data storage and processing as well as data modeling and analysis capabilities, which dramatically increases the possibilities for transformation of banks' business processes.

Storage capacity has multiplied by more than 300 since the year 2000, and improved compression techniques and more sophisticated technology have allowed for storage costs to be considerably reduced⁴⁸. Processing systems are providing a faster response through improved processors and the use of techniques and architectures designed to allow parallelization⁴⁹.

As a result, the data modeling and analysis process has seen remarkable developments, making it possible to use machine learning techniques that are capable of processing massive volumes of information while also being more efficient,

thorough and automated, as well as new forms of data analysis that allow the use of information in real time.

Digitization and Demand Change: Increasingly Digital Customers

The transformation of consumer habits and preferences as a result of Internet and smartphone development and penetration in the financial industry has had a significant impact on changing demand for financial products and services: the customer now has more information and the differences across financial brands, including non-bank providers, have become diluted.

New technologies have also led to changes in customer demand, since customers expect financial services to be accessible from anywhere and at any time, and to be fairly simple. There are several reasons for this⁵⁰:

- ▶ Customers are increasingly familiar with digital media interaction.
- ▶ A physical presence is not needed for the offer of financial services to take place.
- ▶ The emergence of non-traditional agents with lower regulatory requirements that can offer a user experience similar to that of banking operators.

All of the above has a direct economic impact on the business; an exponential sales increase is expected⁵¹ for companies whose business model is based on the use of big data and data mining: it is estimated that the revenues of companies engaged in these areas will grow from \$640 billion in 2015 to \$38,000 billion in 2025.

In addition, digitization represents an economic benefit since it improves the efficiency of financial institutions: it is estimated⁵² that digitization of data-intensive processes can reduce costs by up to 90%, and increase revenues by up to 19 times.

⁴⁴ECB (2016h).

⁴⁵ECB (2016b).

⁴⁶Targeted Review of Internal Models.

⁴⁷For more details see Management Solutions (2015).

⁴⁸McCallum (2015).

⁴⁹BBVA Research (2015).

⁵⁰Ibid.

⁵¹Economic Intelligence Unit (2016).

⁵²Deutsche Bank: Delighting Customers and Democratizing Finance: Digitalisation and the Future of Commercial Banking. Junio 2015.



New market players

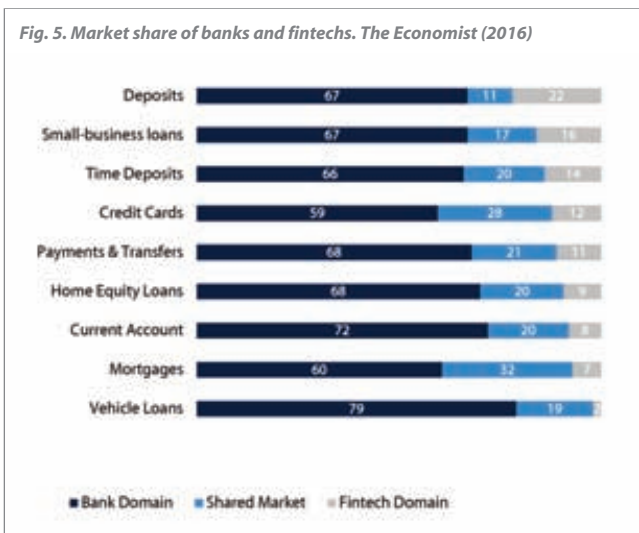
The entry of new market competitors whose value proposition is based on digitization and big data represents a challenge for financial institutions. Although in the long term this threat is expected to become diluted both because traditional banks will adopt new technologies and because regulations will be increasingly applied to fintechs, in the short and medium term financial institutions have to deal with the increase in costs associated with digitization and the loss of income resulting from increased competition, which reduces the profitability of the banking activity⁵³.

There are some business areas in which, in spite of regulations being increasingly applicable to other market players and the early adoption of new technology on the part of banks, there is a greater risk that fintechs will dominate over traditional financial institutions. These areas include the payment services business, in which there is much competition from technology companies, as well as the investment and portfolio management business, crowdfunding and peer-to-peer financing, for example⁵⁴.

The non-bank companies that are better positioned in these services are large IT corporations like Google, Apple, Facebook or Amazon. One of the main reasons is that they have a comparative advantage in terms of cost flexibility and technology platforms as well as greater access to data and a large customer base. There are also initiatives in this area by retailers and supermarket chains. According to the experts⁵⁵:

A concern that the banks have is the arrival of big ecosystems that will replace them, so Google, Facebook, Apple, etc. These are customer-based. The customers are already users of these environments. If they start pushing financial services to their own customer bases, these ecosystems can potentially take customers away from the banks.

In this regard, studies⁵⁶ show that 20% of banks are implementing parallel digital businesses as a strategy for digital transformation. Of these parallel banks, 85% will provide differentiated products and services compared to traditional banks and 81% will use different marketing channels and different backoffice processes and technologies.

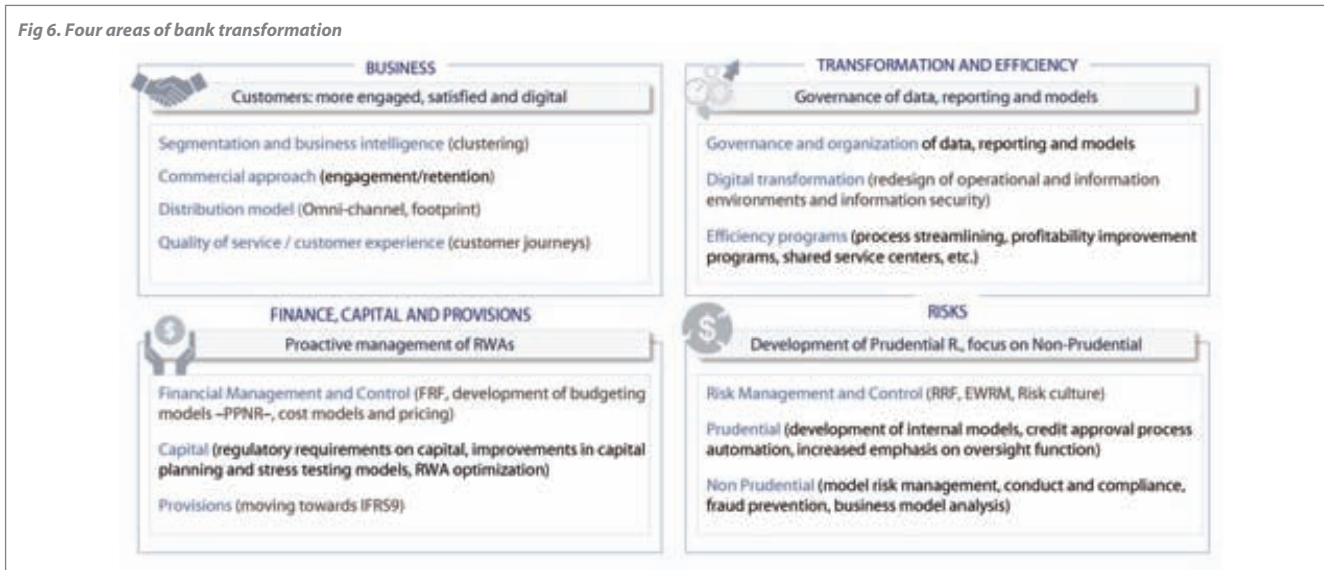


⁵³ECB (2017).

⁵⁴Ibid.

⁵⁵A. Hatami, former Director of Digital Payments and Innovation en Lloyds Bank.

⁵⁶EFMA (2016). The survey was conducted on a total of 158 entities from 56 countries.



As for the impact of this paradigm shift on financial institutions, it is expected⁵⁷ that there will be significant differences in ROE (up to 45% by 2020) between those banks adopting fintech technologies and those that do not.

Financial industry response to these challenges

Faced with the challenge that transformation of the landscape in which they operate represents, banks are undertaking different processes to adapt their business model with a view to increasing profitability.

It should be noted that there is no single strategy used by financial institutions to adapt their business model. Initially, banks had similar strategies with widespread use of wholesale funding and a partial move towards more complex assets⁵⁸. Today, however, banks’ strategies differ both in terms of their starting points and their approach.

However, although bank transformation is following different paths, it has some common patterns: the industry is focusing on the business and the customer, organizational transformation and efficiency, and financial and risk management (Fig. 6).

Business

In the current market environment, customers have more access to information and are able to evaluate a greater number of alternatives and providers to cover their needs, which causes a feeling of greater control over their relationship with financial institutions. As a result, to evolve their business models banks must necessarily increase the

focus on customers in order to better understand their needs and offer more personalized solutions.

This customer-centric approach seeks to increase customer engagement at both the economic and the emotional level, and banks are articulating it around four axes:

- ▶ **Business intelligence:** business intelligence development through intensive use of data science techniques (e.g. machine learning) in segmentation, since they allow for greater clustering and hence for a better understanding of the different customer profiles, and also make it possible to anticipate customer behavior towards specific marketing stimuli (advanced modeling: cross/ up selling, abandonment, price sensitivity, etc.).
- ▶ **Business systems:** deployment of a comprehensive business system that coordinates and aligns both the needs of customers according to their context (customer contextual event management) and the business priorities set by banks for each customer cluster (capture, engagement, retention) with their corresponding actions.
- ▶ **Distribution model:** the development of new customer service channels favors greater customer interaction. with them. Banks are therefore reviewing their distribution model in order to set up an efficient multichannel system that prioritizes customer service capabilities by channel (e.g. sales, transactions) and by customer segment. Banks are also reviewing how the branch network is used, since branches are still the most costly element, while at the same time providing a differential customer service factor with respect to what new players are able to offer.

⁵⁷DBS Bank (2015).

⁵⁸G. Montalvo (2014).

Main regulatory trends

With respect to **capital and provisions**, the general trend is a tightening of requirements in terms of both quantity and quality, which extends to liabilities beyond capital, as well as a stronger planning and self-assessment effort by banks:

- ▶ Stricter minimum capital requirements: Basel III raises the CET1 requirement to 4.5% of the APR and introduces the capital conservation buffer, the countercyclical capital buffer and the systemically important bank buffer.
- ▶ Changes to the capital base, including higher capital deductions on equity, new concepts such as CVA, and a smaller set of instruments eligible as capital (mainly AT1 and T2).
- ▶ Changes in the calculation of capital requirements: significant changes in credit risk (SA and IRB) and operational risk (single standardized method – SMA – that eliminates the AMA approach) in the consultation phase and with no defined implementation date; in the case of market risk, FRTB implementation (SA and IMA) not expected to be implemented before January 2019. Review of the definition of default, unifying the materiality threshold and other criteria across the European Union. The ECB is also conducting the TRIM (Targeted Review of Internal Models) project, which seeks to analyze a wide selection of European banks' Pillar I models with the aim of harmonizing their approval criteria and reducing unjustified discrepancies in the calculation of RWA's.
- ▶ Changes in the calculation of provisions: following adaptation to IAS 39, IFRS 9 introduces changes in classification and valuation, in the methods for calculating impairment (internal model-based expected loss) and in accounting for financial instrument hedges, enforceable in January 2018.
- ▶ Requirements on balance sheet structure: compliance with the leverage ratio is incorporated as a requirement from January 2018. This is a non-risk-sensitive measure that completes the regulatory framework and that, for some banks with low RWA density, has become the most demanding requirement, which marks the required level of capital; and the minimum TLAC and MREL requirement (18% of RWAs and 6.75% of LRE), which entails holding a proportion of liabilities that can be written down or converted into equity in the event of resolution, enforceable from January 2019 with gradual implementation.
- ▶ In the case of the European Union, capital and liquidity planning and self-assessment: increased ICAAP and ILAAP requirements within the supervisory review and evaluation process (SREP), approaching the CCAR model of the United States.

As for **information and reporting**, there is a requirement for the data governance model to be evolved with a focus on data quality, as well as increased requirements for periodic reports (including new types of reports), and for regulatory reporting to be of the highest quality and consistency, as embodied in the following:

- ▶ The *Principles for effective risk data aggregation and risk reporting* (BCBS 239), which require a comprehensive review of data and risk reporting to ensure their quality, integrity, traceability and

consistency. G-Sibs are required to comply with these principles from January 2016, while the compliance requirement for D-Sibs is 3 years after they have been identified as such.

- ▶ New supervisory reporting formats, which require banks to regularly report to each competent authority on financial information (FINREP), capital (COREP), liquidity, asset encumbrance, leverage ratio and large exposures. In addition, the ECB requires banks under the SSM to report additional credit, market and liquidity risk information on a quarterly basis as part of the STE that is used as input in the ICAAP/ILAAP within the context of the SREP.
- ▶ The ECB has developed a European credit database (AnaCredit) which generates new data requirements in three phases (1Q18, 2T19, 2T20), as well as a working group to determine regulatory reporting progress (by unifying definitions, developing a dictionary of regulatory data and increasing the requirements for data granularity, quality and consistency).
- ▶ There are other reporting requirements such as the ECB's ad-hoc requests for information on banks' asset quality (AQRs); the EMIR standard, which requires banks to report all counterparties (except exclusions) to a certified trade repository holding the records of all OTC and ETD derivative products; and in the United States, the FATCA standard, which promotes fiscal transparency, requires foreign financial institutions (FFIs) to report to the United States' IRS¹ information on US taxpayer financial accounts with FFIs.

In addition, there are **other requirements** that affect several areas of the banking activity, including:

- ▶ Conduct risk requirements, which introduce more demanding requirements across the product life cycle and focus on investor protection (MiFID II/MiFIR, Market Abuse Regulation, AML, Mortgage Credit Directive), partly due to US and UK influence (Mortgage Market Review and Retail Distribution Review in the UK, Dodd-Frank in the US, etc.).
- ▶ Model risk requirements, which widen the scope and in certain cases introduce measurement requirements (OCC/Fed - Supervisory Guidance on MRM; EBA - Prudent Valuation).
- ▶ The different regulations on ring fencing, which introduce the separation between traditional and investment banking and prohibit certain investment/trading activities (Liikanen Report in Europe, Volcker Rule in the USA, Banking Reform Bill in the UK).
- ▶ Requirements on the development of resolution plans by banks, through the BRRD in the EU and the Dodd-Frank Act in the US, which must be reviewed at least on an annual basis.

¹Internal Revenue Service.

- ▶ **Customer journeys and quality:** improved customer experience through the review of customer journeys, incorporating digital elements that help both to improve the quality perceived by the customer (e.g. reduced time to market, zero errors) and to make processes more efficient. Quality then becomes a key element of any business strategy, since there is an almost perfect correlation between perceived quality and the next purchase.

Transformation and efficiency

Driven largely by regulation (BCBS 239, SR 11-7), and with profound management implications, a complete transformation of data, information reporting and model governance is taking place through the development of frameworks that give structure to the principles, actors (with new roles such as the Head of Data, Chief Data Officer, Data Stewards, Model Risk Officer, etc.), committees, critical processes related to data, information reporting and models, tools (data dictionary, datawarehouse architecture, data analysis solutions, inventory and workflow of models, etc.) and data quality control. Closely linked to this, data security is being treated as a top priority by financial institutions.

Also, efficiency improvements have been made through process review plans for transaction and data-related environments, including:

- ▶ Structure cost optimization (by reducing the number of branch offices and employees). Thus, in the European Union, the number of offices decreased by 12% in 2011-2015, while the number of employees fell by 7% over the same period⁵⁹.
- ▶ Organizational streamlining by eliminating management levels, simplifying and automating support processes, implementing technologies that allow information to be processed directly⁶⁰, and creating shared service centers.
- ▶ Business offer streamlining through product map analysis, which makes it possible to reduce operating costs as well as costs associated with legal and reputational risks.
- ▶ Segregation of specific unprofitable assets, as with the creation of the so-called "bad banks", or the split of real estate activities from traditional business units, creating separate units to manage this type of assets.

Although these measures have been widespread, there are still significant differences in terms of efficiency (Fig. 7). The efficiency ratio varies quite significantly across banks—between 45% and 70% for most countries⁶¹, and exceeds 80% in some cases⁶².

All of the above is combined with the unstoppable **digital transformation**, which banks are addressing largely due to the speed at which their customers are gaining access to and assimilating new technologies. While this digitization process is taking place at different speeds across the industry, there are some common aspects to it in a number of areas in terms of implementation:

- ▶ **Data:** encouraging greater customer interaction leads to a considerable increase in data generation, and the initiatives for capturing, storing, processing and analyzing this data under new Big Data environments have become essential in this process of transformation. All of this is combined with a thorough transformation of data governance, largely driven by regulations (BCBS 239), but with profound management implications, which has resulted in frameworks being developed to appoint committees, roles (Head of Data, CDO, etc.) and critical data-related processes, as well as tools that facilitate management (data dictionary) and indicators and their associated quality plans.
- ▶ **Modeling:** data mining and analysis is becoming a differentiating element in the value proposition, since the use of advanced analytical techniques in this area allows banks to offer a more personalized product. Incorporating new analytical capabilities means banks need to avail themselves of data scientists, new advanced algorithms (machine learning, natural language processing, artificial intelligence) and new applications, among other measures. As with data, this requires strengthening model governance.

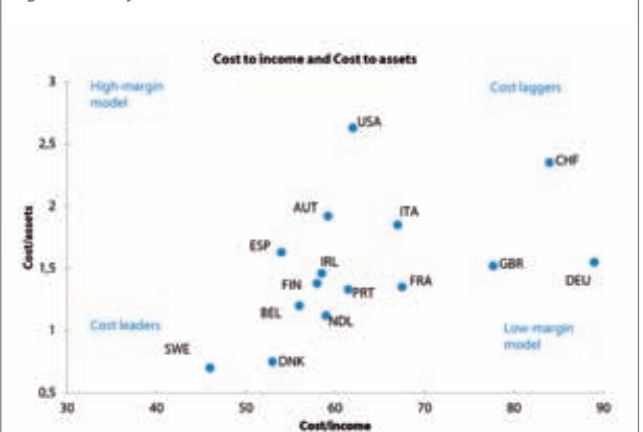
⁵⁹ECB (2015a).

⁶⁰Espí, J.M. (2015).

⁶¹Recognizing that there are structural differences across countries in terms of their efficiency ratio, and that there are no data clearly showing banks' efforts other than this ratio.

⁶²IMF (2016).

Fig 7. Efficiency ratio of EU financial institutions



Source: EBA (2016).

- ▶ **Processes:** digitization helps business processes by improving their implementation (robust processes, shorter time-to-market), control and quality in a broad sense, from traditional quality to the customer experience. Therefore, customer journey transformation is also an important area of development where new solutions and customer interaction mechanisms (e.g. mobile, social networks) need to be incorporated using an end-to-end process approach.
- ▶ **Architecture:** another necessary element in digital evolution is the design of initiatives focused on IT architecture review and development, which stems from (i) the issues discussed in the above paragraphs; (ii) the need to improve efficiency in an environment of new technologies that make this possible; and (iii) the emergence of new technologies and solutions that provide new capabilities so far not available (e.g. Blockchain, biometrics, augmented / virtual reality, etc.).
- ▶ **Cybersecurity:** in this digital environment, it is necessary to establish new security and information access mechanisms aimed at preventing cyberattacks or vulnerabilities in the information, stemming from both external and internal agents.
- ▶ **Organization:** all these aspects described imply a strong organizational move towards capturing and developing digital talent, and organizations are working on several fronts to adapt to this new environment: new profiles are required in addition to new roles and functions; new working methods such as agile collaborative frameworks (scrum, DevOps, etc.) are being used in addition to traditional work methodologies in order to reduce the level of uncertainty as to the final product; change is being managed for the whole process as this is key to ensuring a smooth transition to digital.

Finance, capital and provisions

Management and control tools are being improved in order to ensure that the different management and budgeting activities are aligned with each other as well as with the goals set by the financial institution. Banks are refining their financial planning and budgeting models, using new inputs, developing income statement projection models (PPNR) and evolving the associated processes and tools.

Similarly, banks are reviewing all pricing components to ensure that the price includes all relevant costs, that appropriate cost allocation criteria are used and that value creation or destruction is properly measured for the different businesses, segments and customers. For this, banks are acting in various areas:

- ▶ **Organization and governance:** involving senior management, reinforcing the roles responsible and integrating the use of pricing in the bank's management .
- ▶ **Modeling:** incorporating new elements, adjusting the metrics used, reviewing the information necessary to carry out this calculation, and increasing the extent to which models are challenged by top management.
- ▶ **Channels and processes:** identifying channel characteristics with the aim of individualizing price calculation according to cost and establishing specific procedures and policies for action.
- ▶ **Tools:** using model managers and pricing policies as well as information platforms and pricing calculators to ensure data consolidation, correct implementation of pricing models and integration into related processes.



From a liquidity point of view, banks are dedicating significant efforts to improving their data, measurement models and support infrastructure with a view to making the liquidity information they manage more granular and frequent.

Another financial planning-related measure is RWA optimization based on the different capital and leverage requirements, aimed at maximizing the expected return on assets for a level of capital determined through the use of capital planning and stress testing models, as well as a greater focus on capital allocation.

Finally, banks are focusing their efforts on adapting their provisioning models to IFRS 9, which, among other measures, changes the approach to credit portfolio loss estimation from incurred to expected losses. Beyond the need to comply with the accounting standard, this has management implications across the organization (e.g. its use for pricing purposes).

Risks

In the area of Risk, from an industry-wide perspective, banks are focusing on the development of integrated risk management and reporting frameworks such as the Risk Reporting Framework and the Enterprise-Wide Risk Management Framework. Much attention is also being given to promoting a risk culture throughout the organization in terms of risk appetite and limit structure development and implementation.

As for the management of prudential risks (credit, market, liquidity, operational, etc.), the main trends revolve around (i) organizational aspects, namely separating the policy definition, global control and reporting functions, on the one hand, from risk management (i.e. origination, monitoring and collections in the area of credit), on the other; (ii) the emergence of the portfolio manager role, who defines and supervises the plans for each segment from the point of view of Risks; (iii) evolving internal models beyond regulatory compliance and reinforcing their use in management, as well as introducing machine learning techniques to simplify how models are built and improve their predictive power; and (iv) process reengineering, to simplify and automate processes in order to reduce times and improve the customer experience.

Finally, with regard to non-prudential risks, banks are either developing or reinforcing model risk, conduct risk and compliance risk management functions across the organization, as well as fraud prevention. Moreover, banks are beginning to undertake internal BMA activities, as will be discussed below.

Changes in business models

A detailed descriptive analysis of the changes that have taken place in several key parameters for financial institutions allows us to understand the impact of these factors on each business model. To this end, and in line with the ECB¹, some studies² group banking business models into several types and describe how these parameters have changed over time for each type³:

- ▶ **Large global banks:** of the six business models, this one refers to the largest banks, including G-Sibs of up to 2 trillion euros in assets. Around 60% of their income is derived from interest, mainly from loans, and the remaining 40% comes mainly from commissions and revenues from trading. However, their investment activity has been significantly reduced (as shown by the decrease in their trading assets/total assets and derivatives/total assets ratios for the 2012Q2-2015Q4 period). These have also been the banks with the highest leverage levels, though leverage has been reduced by more than a third from pre-crisis levels.
- ▶ **Wholesale banks:** they are the second largest banks, with assets amounting to around 100,000 million euros per institution. They focus on financing corporate clients, who account for over half of their loans, in addition to holding a substantial trading book with trading securities and derivatives. These banks had a significant volume of mortgage-related securities before 2009, which explains how they have changed during and after the crisis. The higher cost of wholesale funding in the wake of the crisis explains how these banks have sought to replace it with retail financing, which is reflected in their changing loan-to-deposit ratio, which has experienced the largest decrease out of all business models, going from 150% to 120% in 2009Q2-2015Q4⁴.
- ▶ **Asset managers and commission-based banks:** third group in terms of entity size, more than half of their income comes from commissions, and their loans are less than half their assets. In addition to asset managers, this business model includes commission-focused banks (such as trade finance, advice, guarantees, etc.), which are often transnational entities. This type of business model was affected by the sovereign debt crisis (2010Q1-2012Q2) to a greater extent than the other models. The trend for this model during this period of time has been a decrease in the proportion of income from trading, partially offset by an increase in commissions.
- ▶ **Smaller credit institutions:** With assets under 50,000 million euros per entity, lending activity for these financial institutions is more or less equally divided between retail and corporates. They are usually well capitalized, have little leverage and most of their funds come from deposits. The ratios analyzed for entities that fall under this business model are the ones showing the greatest stability, largely due to their business diversification.

¹ECB (2016m).

²Schwaab B. (ECB) et al. (2016).

³Conclusions extracted from Schwaab B. (ECB) et al. (2016). Please refer to the article for a more in-depth analysis.

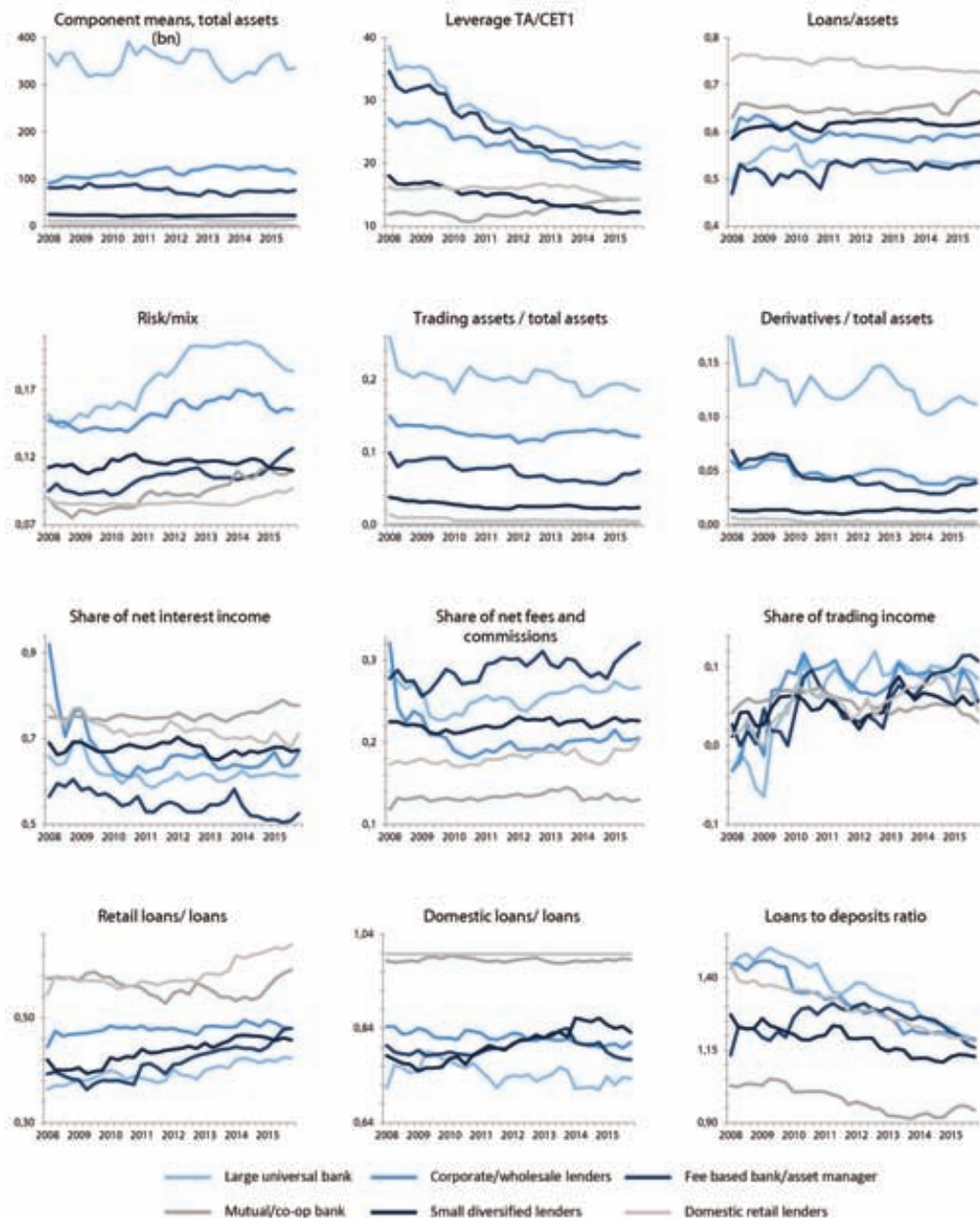
⁴BIS (2014)

► **Local retail credit institutions and credit cooperatives:** these are the smaller entities, with assets per entity below 20,000 million euros, and are also the most numerous. Therefore, they are important for financial stability, not individually but as a group. Contrary to the general trend for other business models, their leverage ratio increased during the analysis period.

Large global banks and wholesale banks, for example, were the hardest hit by the financial crisis, while the impact on smaller credit institutions, local retailer banks and credit cooperatives was small and did not cause them to significantly change their sources of funding. However, during the 2010-2012 sovereign debt crisis in the euro area, large global banks, asset managers and commission-focused banks were affected the most, given the sharp drop in income from trading; and again, smaller credit institutions, local retail banks and credit cooperatives were the least affected.

The above shows that all financial institution types have seen their activity affected in the last few years, albeit in different ways and with different intensity depending on their business model.

Fig. 8. Changes in key parameters of European institutions according to their business model



Source: Schwaab B. (ECB) et al. (2016).

The supervisory approach: business model analysis

We will therefore be looking very closely to see whether banks are adjusting their business models, what direction they are moving in, and what risks that involves

Sabine Lautenschläger⁶³



Banking business models have received special attention from regulators and supervisors since the financial crisis started in 2007, since some models (such as the *originate-to-distribute*⁶⁴ model) contributed to either triggering or aggravating this crisis⁶⁵.

For the same reason, and driven by concerns about the already described threats and decrease in profitability, in recent years banks have improved those organizational and management components that focus on the business model as a source of risk or as an analysis tool. These components are the consideration of the business risk and the analysis of the business model (Fig. 9).

The concept of **business or strategic risk**⁶⁶ has been used in the financial sector for more than a decade. It was defined by the CEBS (predecessor of the EBA) as⁶⁷:

[...] the current or prospective risk to earnings and capital arising from changes in the business environment and from adverse business decisions, improper implementation of decisions or lack of responsiveness to changes in the business environment.

The Basel Committee on Banking Supervision defines business risk as⁶⁸:

[...] the risk to the firm's future earnings, dividend distributions and equity price. In leading practice banks, business risk is more clearly defined as the risk that volumes will decrease or margins shrink, with no opportunity to offset the revenue declines with a reduction in costs.

This risk is covered by Basel Pillar II requirements, and as such the banks have been considering it and reporting it as part of their ICAAP process and, in most jurisdictions, allocating capital for it.

On the other hand, **business model analysis** (BMA) can be defined, according to the EBA⁶⁹, as a strategic and business risk assessment exercise aimed at determining the organization's viability and sustainability:

[...] the viability of the institution's current business model on the basis of its ability to generate acceptable returns over the following 12 months; and the sustainability of the institution's strategy on the basis of its ability to generate acceptable returns over a forward-looking period of at least 3 years, based on its strategic plans and financial forecasts.

While it is true that the focus and depth of the BMA exercise vary according to geography, there is a common trend among supervisory authorities across jurisdictions to promote the role of this analysis as a supervisory tool. This is a result of reduced bank profitability due to pressure from the already described factors.

Nevertheless, it is in the European Union that the BMA has taken on a more specific form, acquiring a specific name and methodology as well as priority status and becoming integrated in SREP as part of the supervisory rating of banks' business models. For this reason, this section analyzes the case of BMA in Europe in detail.

⁶³ECB (2016f).

⁶⁴Based on moving the originated transactions off-balance sheet, which led to lower credit quality requirements as well as to a significant increase in loan securitization and underwriting.

⁶⁵CEPS (2016).

⁶⁶Among regulators and the industry, there is no agreed distinction between the terms "business risk" and "strategic risk", so for the purposes of this study they are considered to be synonymous.

⁶⁷EBA/CEBS (2004).

⁶⁸BIS (2008).

⁶⁹EBA (2014).

Fig. 9. Elements impacting the banking business model

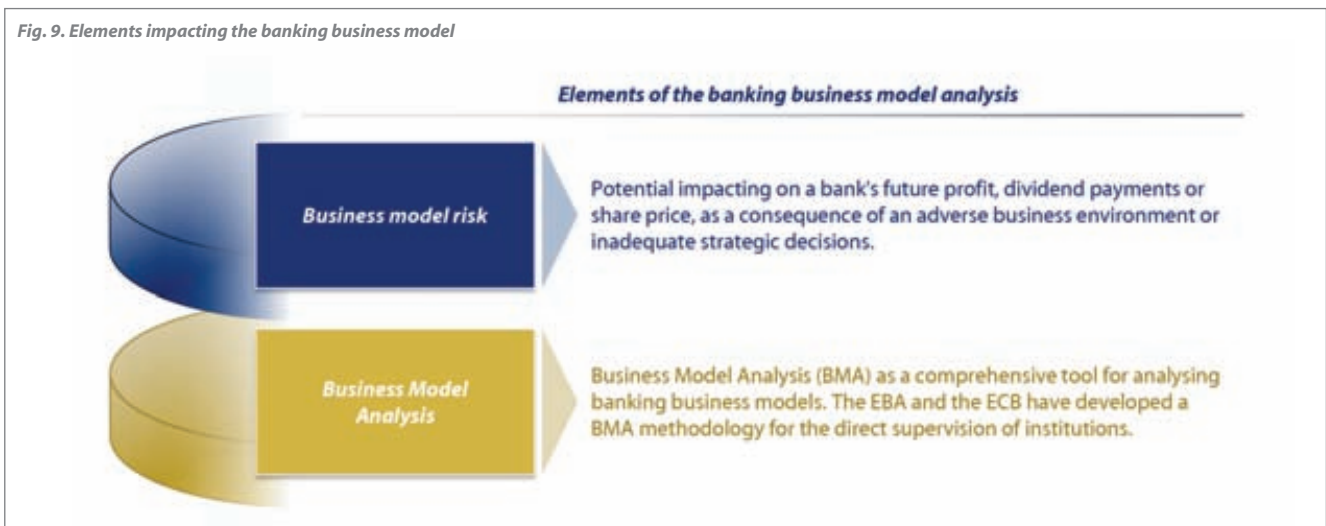
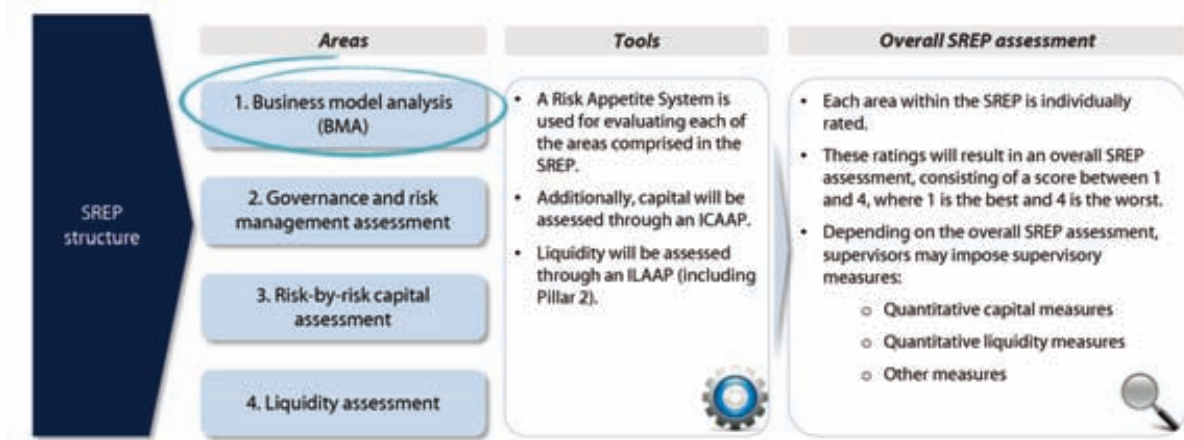


Fig 10. SREP structure



Source: EBA (2014) and own elaboration.

The BMA as a supervisory tool in the European Union

In December 2014, the EBA published guidelines⁷⁰ on the procedures and methodologies for the supervisory review and evaluation process, which providing key indications for conducting the supervisory review and evaluation process as set out in CRD IV. The main novelty in this scheme is that BMA is given top priority, being placed as one of the four pillars in the supervisory scoring process (Fig. 10).

The ECB, for its part, has considered BMA to be one of the supervisory priorities. In the words of S. Lautenschläger⁷¹:

Banks' business models continue to be one of the most important topics for us as supervisors. We are also of the view that some institutions urgently need to adjust their business models.

The different supervisory authorities in the EU have gradually adopted the SREP structure to carry out an overall assessment of banks and to establish supervision measures on capital, liquidity or other aspects. The aim is to determine the

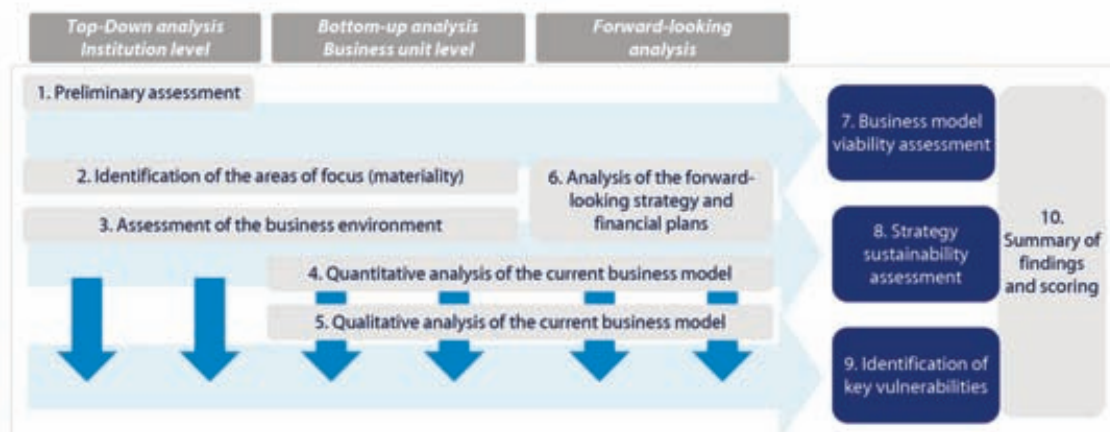
strengths and weaknesses of each financial institution, both individually and as benchmarked against a peer group of similar institutions.

This makes it possible to examine how the bank's business plan might potentially develop, to assess the strength of existing mitigation plans and to analyze the projection of the bank's key economic and financial indicators.

Where significant vulnerabilities are identified, early action measures are proposed with the aim of preventing bankruptcy or lessening the potential impact of the identified weaknesses on the industry as a whole.

To this end, the BMA proposed by EBA takes place over ten phases (Fig. 11):

Fig 11. BMA phases



Source: EBA (2014) and own elaboration

⁷⁰EBA (2014).

⁷¹ECB (2016g).

BMA in other geographies

The supervisory approach to BMA differs according to geography in terms of both the relevance given to it as a supervisory tool and its scope and coverage.

BMA in the UK

In the case of the UK, the business model is reviewed from different perspectives by the Prudential Regulation Authority (PRA) and the Financial Conduct Authority (FCA), as well as within the Bank of England's stress test.

Although the prudential framework for the EU is also applicable in the UK¹, the practice followed by the PRA should be analyzed separately due to the fact that the UK does not form part of the SSM and because, though it follows the Basel III approach, the UK has traditionally left the prudential regulation² specifics in the hands of the Bank of England.

The PRA³ conducts an analysis of the business model, similar to that carried out by the ECB, aimed at adequately capturing the components that generate returns for the bank and are therefore the basis for its sustainability, allowing the supervisor to understand the bank's potential vulnerabilities.

This analysis includes elements such as profitability, risk appetite, the bank's objectives and underlying assumptions, and the bank's own estimates as well as the reasonableness of the approach. The PRA also emphasizes that banks should develop specific stress scenarios for their business model.

If the supervisor is of the opinion that the business model does not adequately mitigate risks and this poses a risk to the bank's security and integrity, the supervisor may request the bank to modify its business model to avoid this risk⁴.

FCA⁵, for its part, conducts an analysis of the business model from the perspective of maintaining market integrity and competition, as well as protecting the consumer from potential abuse or unethical behavior by banks. The analysis approach depends on the size of the bank.

The purpose of this analysis by the FCA is to understand the potential risks banks' strategies and business models may pose to the market and consumers. For this reason, the elements that receive special attention at either the bank or product level are: rapid growth, high profitability levels, cross-selling strategies, products with unclear prices or conditions, products sold in markets for which they were not designed and conflicts of interest.

Finally, the Bank of England recently included as a stress test element a biennial analysis exercise whose purpose is to analyze banks' strategic response to structural changes in the environment in which they operate⁶. This exercise does not involve an analysis of banks' capital, but rather analyzes the sustainability of their business model under hypothetical scenarios. This makes it possible to anticipate changes to the business model resulting from banks adapting to their environment, which allows the main supervisory committees⁷ to understand and anticipate any potential changes in the financial system should a hypothetical scenario materialize.

BMA in the US

In the United States, the Federal Reserve (Fed), the Office of the Comptroller of the Currency (OCC) and the Federal Deposit Insurance Corporation (FDIC) cite, in their respective supervision manuals, some aspects related to the analysis of banks' business models.

According to the Fed's Bank Holding Company Supervision Manual⁸, for each BHC⁹ (and also for FBO¹⁰ operations in the US), the supervisor needs to have an understanding of the key elements of strategy, main sources of income, risk drivers, business lines, structure of legal entities, governance and internal control framework, and presence in key financial markets. Thus, the supervisory program focuses on the analysis of business, profitability and strategy models.

On the other hand, in its document "Bank supervision Process"¹¹ the OCC establishes that strategic risk is one of the risks to be measured and controlled. In this regard, its Risk Assessment System (RAS) supervision manual specifies that assessing this risk includes not only an analysis of the specific bank's strategic plan, but also issues relating to opportunity cost and how the bank's management team analyzes external factors (e.g. economic, technological, competition, regulatory, etc.) that may affect the bank's own strategic development.

In the case of the CAMELS rating, which is carried out by different supervisors such as the Fed, OCC, FDIC, NCUA¹² and FCA¹³, each bank's business model is assessed across six components: capital adequacy, asset quality, management, revenue, liquidity and market risk sensitivity. This rating takes values from 1 (best) to 5 (worst), and banks rated 3 to 5 may be subject to supervisory action, closer monitoring and limitations to their business plan. Also, this analysis is used as input for RAS development.



¹While Brexit activation can generate uncertainty as to the changes that may be made to legislation in the medium term.

²Blundell-Wignall (2014).

³PRA (2016).

⁴PRA (2016). párrafo 62.

⁵FCA (2015).

⁶BoE (2017).

⁷Financial Policy Committee y Prudential Regulation Committee.

⁸Fed (2016a).

⁹Bank Holding Company.

¹⁰Foreign Banking Organization.

¹¹OCC (2012).

¹²National Credit Union Administration.

¹³Farm Credit Administration.

¹⁴OCC (2007).



1. Preliminary assessment: analyzing and identifying the bank's main activities, products and businesses, as well as its relative position against the market.
2. Identification of relevant areas: determining the BMA scope and identifying relevant areas for feasibility and sustainability analysis purposes.
3. Analysis of the business environment: analyzing the current and future conditions for the business.
4. Quantitative analysis of the current business model: analyzing the bank's financial results, how they relate to risk appetite, and performing a horizontal benchmark against a reference group.
5. Qualitative analysis of the current business model: analyzing the bank's key success factors and main dependencies.
6. Analysis of strategy and business plans: undertaking a qualitative and quantitative analysis with a prospective approach, with the aim of understanding the business plan assumptions and evaluating how the strategy as well as the related risks might evolve as well as the associated risks.
7. Business model viability evaluation: assessing the bank's ability to generate sufficient returns over the next 12 months.
8. Strategy sustainability evaluation: assess the bank's ability to generate sufficient returns over a period of at least 3 years.
9. Identification of vulnerabilities: identifying potential vulnerabilities in the business strategy.
10. Summary of results and scoring: summarizing the result in a report and calculating the score from this SREP component.

In order to carry out this exercise, the supervisor requires the bank to provide information on its strategic plans and future projections of different figures, as well as financial and prudential, regulatory (i.e. FINREP and COREP) and internal reports. This information is supplemented with the bank's recovery and resolution plans, and third party reports on the institution (audit reports, analyst reports), and other relevant information from regulatory authorities and bodies.

Through BMA, the supervisor seeks to understand the materiality of the different business areas, evaluate the bank's ability to generate profits, and issue an opinion on the institution's viability and sustainability.





All this represents the input that will be used in the final score to be issued by the supervisor. As in all other areas, the supervisor may propose corrective measures to address the weaknesses observed, in addition to issuing a score.

Level of convergence in the European Union

Regarding the degree of implementation and uniformity of this approach, national authorities have adapted the practices provided in the guidelines with different approaches as to their implementation. According to the EBA⁷², while in some cases permanent, dedicated teams have been set up for this review, in others BMA has been established as an additional supervisory activity without changing the composition and responsibilities of the supervising teams.

The EBA believes that the level of understanding by the national supervisors has been adequate and that there is relevant questioning of the financial institution's strategic plans, in addition to analysis on the viability and sustainability of the bank's model and business strategy, thus improving the forward-looking nature of the SREP. However, the EBA also believes that the current review of the different supervisory practices is not yet sufficiently deep.

In summary, from a regulatory point of view, BMA has been decisively strengthened in the EU, especially in the Eurozone, where the review of business models has become a top priority tool that has an impact on the supervisor's score.

⁷²EBA (2016a).

BMA developments

Traditionally, BMA was a supplementary tool in the supervisory review effort, being an aspect of analysis for creating the risk matrix that would determine the risk profile of the bank to be evaluated by the supervisor.

BMA also had some prominence in the development of the EU's term sheets for agreeing bailouts for financial institutions, where the institutions in question were required to dispose of their less profitable and riskier regional businesses and expansions. As an example, section 15 of the MOU signed by Spain on July 20, 2012 stated¹:

The restructuring plans will address the bank's ability to generate profitable and sustainable business activity in the future, as well as its financing needs.

As a general rule, supervisory review exercises focused on solvency analysis and capital stress testing over a relatively short time horizon, but excluded the long-term approach as well as the analysis of the profitability of banks' business lines.

However, this solvency-focused approach changed after the crisis to include BMA as a supervisory tool that had the potential to provide greater insight into banks, their strategy and business, in order to better understand the risks to which they are exposed.

Some of these supervisory authorities have evolved towards a more in-depth BMA, supported by higher emphasis on-site reviews and more frequent meetings with banks. With this greater regulatory effort, supervisors seek to adapt their approach to each individual bank's activities, strategies and objectives by line of business, as well as to identify emerging risks and vulnerabilities arising from these risks.

¹Ministerio de Asuntos Exteriores y de Cooperación of Spain (2012).

Business model analysis tools

*Everything that can be counted does not necessarily count;
everything that counts cannot necessarily be counted*

Albert Einstein⁷³



Banks' response to BMA

In Europe, the financial industry responded to the EBA's proposal, later developed by the ECB, with different levels of acceptance, not so much in relation to the EBA's intention to conduct a business model analysis (BMA) itself but because of the way in which it proposed to implement it. Some of the main industry responses to the EBA's proposed BMA are summarized below.

- ▶ **European Banking Federation (EBF)⁷⁴**: recognizes the need for the supervisory BMA, but opposes the use of a score to rate the risk in each bank's business model:

We think that setting a score to the business model is out of scope because the remit of supervision should be confined to the evaluation of compliance within the regulatory framework rather than assessing and grading the viability of the business model and business strategies. Appending a score may result in unintended consequences and effects on the share price of the firm. [...] Setting a score risks driving banks to all have the same business model.

- ▶ **British Bankers' Association (BBA)⁷⁵**: expresses doubts about how the score resulting from the BMA will be arrived at by the supervisor:

It is not clear how competent authorities will apply SREP scoring of 1-4 to BMA given that there are no widely accepted indicators for evaluating what a viable business model and sustainable business strategy are.

- ▶ **German Banking Industry Committee (GBIC)⁷⁶**: recognizes the benefit of BMA as a tool to gather information for other SREP components but firmly opposes the supervisor's interference in banks' business decisions:

Including an analysis of business models and of the sustainability of business strategies in the SREP guidelines introduces an important new element to banking supervision. The benefit of this new element will lie above all in the information which will assist in planning and support the other elements of the SREP. We would strongly oppose any inference that supervisors should have a say in banks' business policies. Supervisors should not see themselves as "better bankers" than the banks themselves. Nor, as representatives of the state, are they in a position to assume the responsibility associated with playing an active role in business policy decisions. This is a task for the banks' owners and management alone.

- ▶ **Fédération Bancaire Française (FBF)⁷⁷**: proposes that BMA be a merely informative tool for the supervisor, with no associated score or possibility for the supervisor to intervene in the strategy of banks:

[...] the guidelines may lead supervisors to exceed their mandate by intervening inappropriately in the strategic management of institutions. While we entirely agree on the need for supervisors to fully understand the business environment and the strategy of institutions in order to support their risk analysis and to understand revenue generation, we think that this must be clearly limited to information and understanding. It should thus be avoided that supervisory findings and recommendations have strategic and business contents, which must remain the responsibility of institutions' management bodies. We would therefore recommend that the BMA is not scored.

- ▶ **Asociación Española de Banca (AEB)⁷⁸**: focuses on the need for standardized and uniform indicators, as well as for market analysis:

We believe that standardized ratios should be established for cases like the current crisis, because it could appear that very few businesses are viable in that situation. [...] It is very difficult to measure the profitability of the business model without a prospective analysis and without market knowledge.

In addition to the responses offered by the industry, banks have been adapting to the BMA requirements individually following publication of the EBA's guidelines but, above all, as a result of their experience of the ECB's practical implementation of BMA in the banks under its supervision as part of the SREP processes carried out to date.

In order to adapt, banks are concentrating on four key aspects:

- ▶ **BMA self-assessment**: by implementing the supervisor's findings and recommendations, banks are developing self-evaluation programs for their business model, largely focused on anticipating the supervisory response.
- ▶ **Strategic planning review**: given the supervisor's attention to banks' strategic plans in BMA, including current and next year forecasts and their underlying assumptions, banks are refining their strategic planning methodology to make it sounder, more analytical and better documented vis-à-vis the supervisor. This includes developing specific planning and stress testing tools that seek to strengthen the different processes, to integrate them into their architecture and to improve control traceability and governance.

⁷³However, the authorship of this quote, which could be from William Bruce Cameron (American sociologist), is not clear.

⁷⁴EBF (2014).

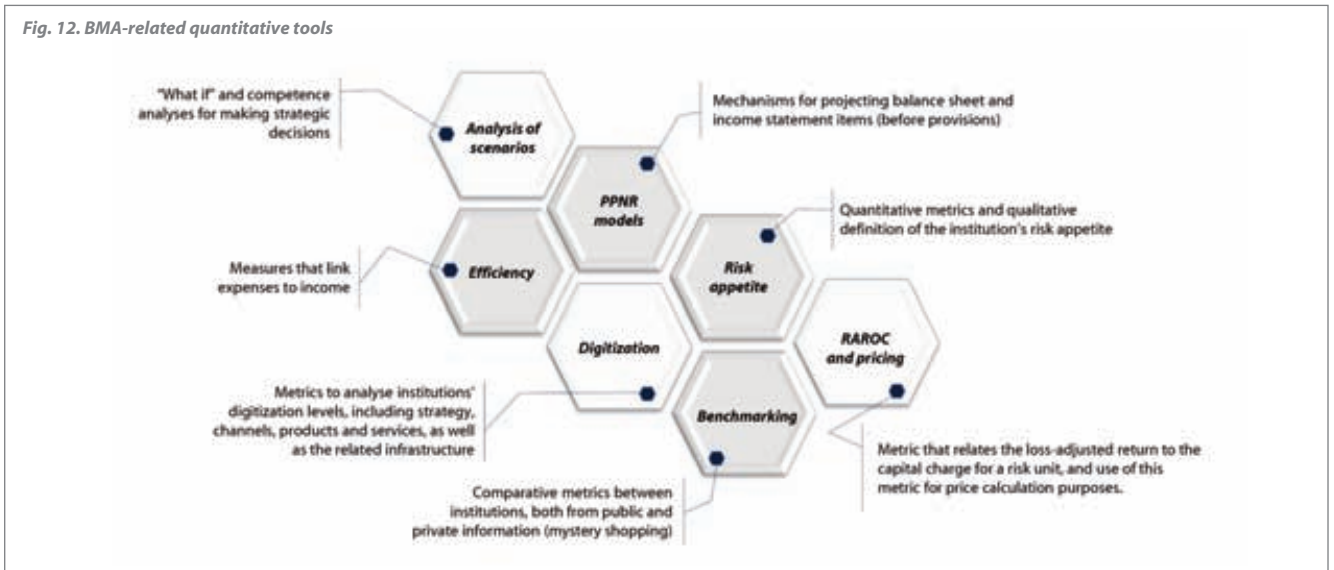
⁷⁵BBA (2014).

⁷⁶GBIC (2014).

⁷⁷FBF (2014).

⁷⁸AEB (2014).

Fig. 12. BMA-related quantitative tools



- ▶ **Improvements to internal reporting:** in line with the above, banks are reviewing and improving their internal documentation and reporting with an impact on BMA, including documentation on capital planning, liquidity reporting, internal risk reports, recovery and resolution plans, and management information as a whole.
- ▶ **Development of BMA-related quantitative tools:** finally, and touching on all of the previous aspects, banks are taking advantage of the supervisory review to promote the development or revision of specific BMA-related quantitative methods.

Quantitative methods for BMA

As can be seen, to date most banks are addressing the issue of BMA from different angles (Risks, Finance, Business, etc.), not necessarily in a coordinated or consistent way, and largely with the aim of responding to the direct requirements of regulators and supervisors.

This results in the absence of an enterprise-wide view of all critical components in the business model, which from a strategic point of view – and not just a regulatory one, permanently questions the bank's business model.

This enterprise-wide view should be underpinned by a business model analysis and follow-up framework, centralized and coordinated across all areas, which draws on quantitative methods (as well as expert judgment) for measuring and projecting its key elements.

Today, the industry is still far from having an enterprise-wide BMA view as described, and the available methods are often not integrated. Many banks have, for instance, income statement projection (PPNR) models for regulatory purposes (e.g. ICAAP, CCAR), and also models that project the same

elements for management purposes (e.g. budgeting), with different scenarios, data, assumptions and methodology, designed in a way that reveals little communication across the different areas, and with limited consistency analysis of results from one exercise to another. Or, in the case of RAROC, there are heterogeneous measures in the areas of Risks, Finance and Business, which are developed independently and generate inconsistencies, for example, when used for pricing purposes.

The following section briefly describes some BMA-related quantitative methods (Fig. 12), that can be part of the comprehensive framework discussed if they are developed with an enterprise-wide view, looking for the greatest common factor in terms of uses across the different areas:

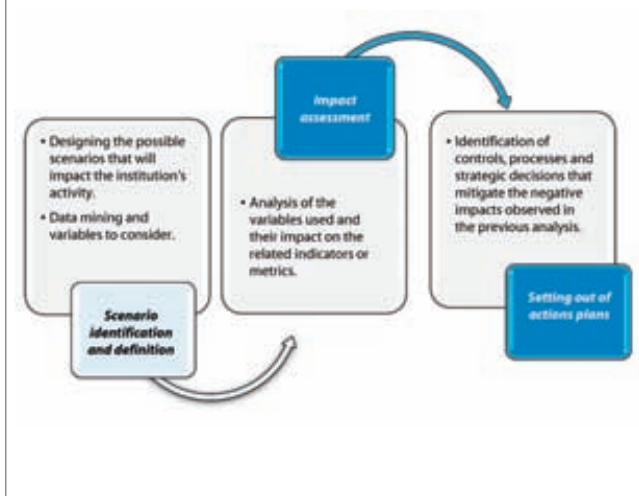
- ▶ **Scenario analysis:** a prospective view of how the bank could be affected by different strategic, enterprise-wide scenarios (thus coordinating the views from the different areas), linked to the risk identification and assessment (RIA) regulatory process, geared to strategic decision-making and continuously enhanced through backtesting⁷⁹.
- ▶ **PPNR models:** a prospective and quantitative view of the balance sheet and income statement under different scenarios (generally macroeconomic) through PPNR models, linked to stress testing exercises and ICAAP⁸⁰ on the regulatory front.
- ▶ **Risk appetite:** analysis of quantitative metrics and qualitative indicators of the bank's risk appetite, including individual, industry and geographical concentration as a key element for identifying vulnerabilities⁸¹.

⁷⁹Grasi, O. (2008).

⁸⁰Knight, C. (2016).

⁸¹BdE (2014).

Fig. 13. Scenario analysis phases



Scenario analysis

What-if analysis and competence analysis are used in the management of banks' strategic models as qualitative tools for control over decision making (M&A, business line and product management, etc.), and are partly driven by regulations as it is the case with the risk identification and assessment process in the US CCAR exercise, which uses scenario analysis.

Analysis takes place in three phases (Fig. 13) and is based on evaluating the outcome of different hypothetical situations, assigning probabilities to outcomes.

The scenarios should be based on a set of hypothetical situations (Fig. 14), looking for consistency between them. These scenarios can use macroeconomic events that have an impact on the economy as a whole, or can be adapted to specific situations affecting the bank's position. In any case, when creating scenarios a balance must be found between the probability of occurrence of the scenario and its severity, considering that, for risk scenarios, both variables are usually negatively related.

Once the scenarios are identified, their effect on the bank, usually quantified in terms of impact on results, solvency (capital) and/or liquidity, should be evaluated. This requires a set of robust models to translate the scenarios defined in terms of impacts on the different risk parameters, and therefore on the results and metrics normally used to evaluate the bank's capital and liquidity position (solvency ratios, LCR, liquidity survival horizon, etc.).⁸⁴

- ▶ **RAROC and pricing:** RAROC analysis to ensure that transaction prices cover all costs, as a method to assess and ensure the business is viable.
- ▶ **Efficiency:** a detailed analysis of efficiency through the cost-to-income ratio and its components, aimed at ensuring business sustainability⁸².
- ▶ **Digitization:** analysis of the level of digital product development, technological adaptation and digital strategic positioning as key success factors of the business model⁸³.
- ▶ **Benchmarking:** analysis of metrics that are comparable across entities, using information from both public and private sources (e.g. mystery shopping).

The above indicators are summarized below, from the perspective of how banks have been using them to date and their relationship with BMA.

⁸²Burguer, A. & Moormann, J. (2008).

⁸³BBVA Research (2015).

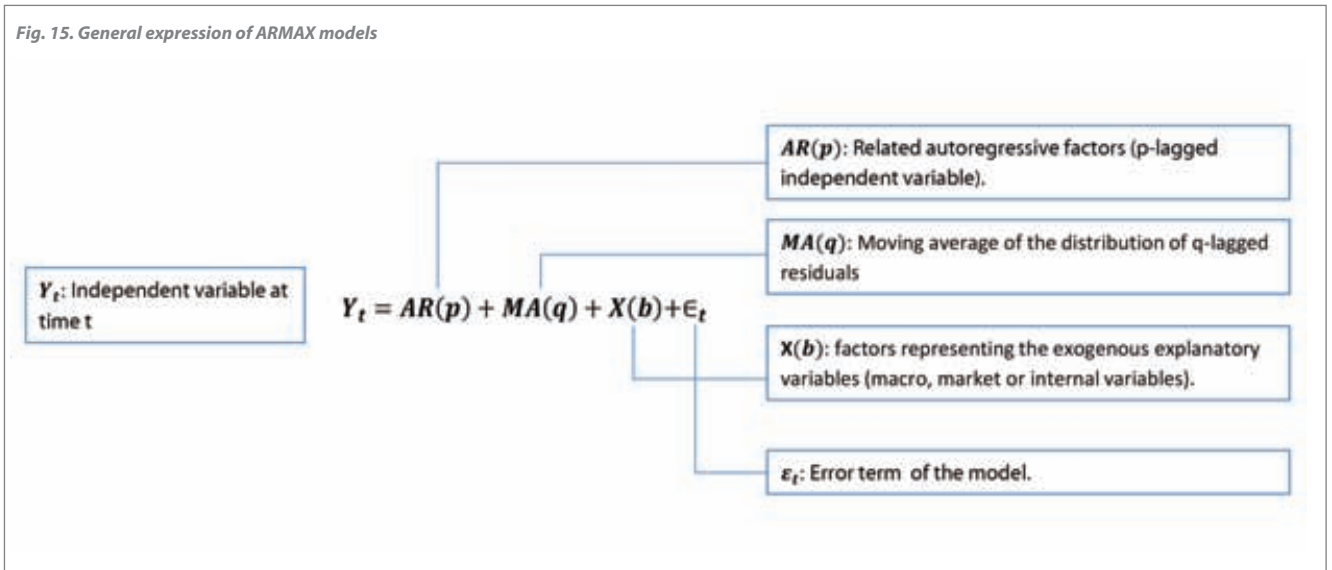
⁸⁴See Management Solutions (2012) for a detailed analysis on the regulatory framework and impact on liquidity risk management, and Management Solutions (2013) for an analysis on the assessment of the capital position under stress scenarios.

Fig. 14. Examples of hypothetical scenarios

Related risk	Variables to be considered	Examples
Economic	Macroeconomic conditions	GDP, inflation, interest rates, debt levels, employment rate, changes in the aggregate demand
	Microeconomic conditions	Changes in organization's size/type/sectoral distribution, changes in wage levels
Market	Financial markets	Prices of fixed-income/variable-income instruments, volatility of market variables, securities prices
	Commodities	Oil, gas or commodity prices
	Other	Property, land, commercial real state prices
Credit	Sovereign	Increase in risk premiums
	All other	Changes in CDS prices, Itraxx prices, etc. Corporate debt risk premiums
Idiosyncratic (its relevance depends on the institution's position)	Regulation	Regulation of floor clauses, capital restrictions or dividend distribution
	Other	Loss of market share to other competitors (e.g. shadow banking)

Source: ECB and own elaboration.

Fig. 15. General expression of ARMAX models



In view of the fact that financial planning, capital planning, liquidity planning and scenario analysis can sometimes be carried out by different areas, from an organizational point of view, it is very important that the different areas involved (Planning, Risks, Capital, Financial Management, Strategy, etc.) should contribute to the scenario definition process, but that this is done in a unified and integrated way. In this respect, some banks have gone a step further and have created a center of excellence for scenario definition, which then uses projections from the different areas.

Finally, it is essential to conduct systematic and periodic backtesting of scenario analysis, with the aim of gradually refining predictions through historical learning. For this, the backtesting process should not just measure the accuracy of past predictions, but also continuously improve the process that results from this measurement. Specifically, in the case of a deviation from expectations, it is essential to identify the drivers that led to this deviation and incorporate them into future predictions.

PPNR models

Motivated by the regulatory and supervisory context discussed above, and recently driven by their use in both BMA and internal management, banks are working on models and mechanisms that will allow them to project balance sheet items as well as income and expenses so as to gain a forward-looking view of the income statement.

PPNR models thus emerged to establish a link between balance sheet items and income, on the one hand, and different exogenous variables sensitive to the macroeconomic environment, on the other.

Depending on the granularity and data limitations commonly observed, the sophistication of these models can vary from the projection of independent variables through simple assumptions or expert judgement to the development of autoregressive models using ARMAX components or models, the general formulation of which responds to the following expression (Fig. 15).

Fig. 16. Illustrative example of ARMAX models

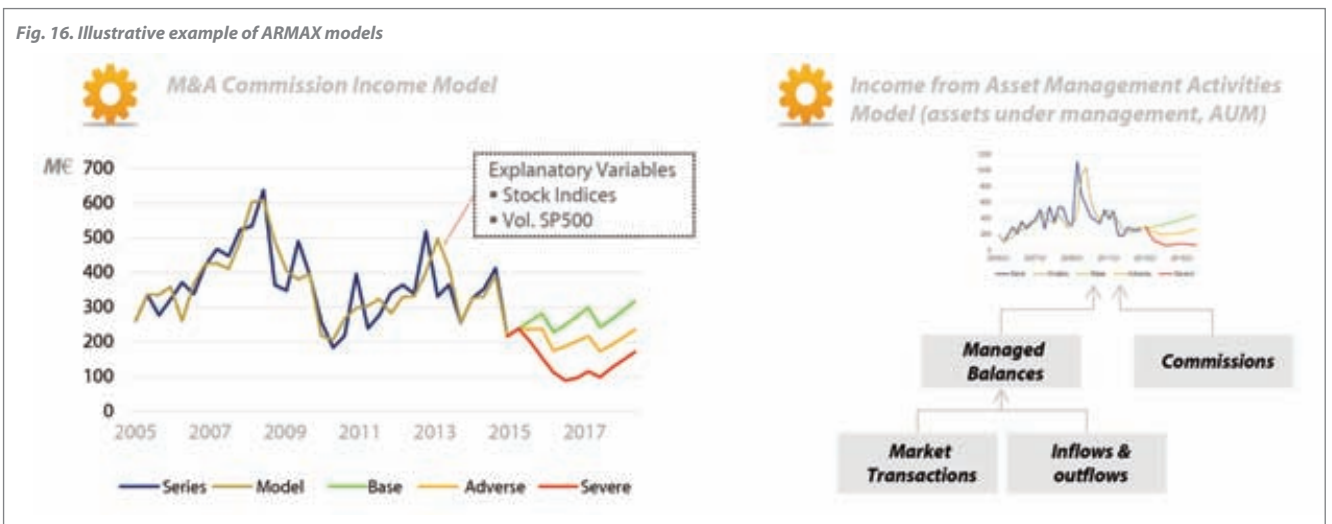


Fig. 17. Example of risk appetite metrics and indicators



Aggregate models are often used when the components of which they are made up do not particularly contribute to explaining the independent variable (Fig. 16). However, it is best practice to sub-segment models by component to capture the specific variables in each.

Finally, and similarly to what has been discussed regarding scenario analysis, it is important that all PPNR projection exercises are carried out in an integrated way (a single process designed for different uses). This way, even if each user area subsequently declines the projections for its specific use (strategic planning, budgeting, ICAAP, etc.), a common basis is ensured that guarantees the consistency and integrity of the bank's exercises.

Risk appetite

Risk appetite, understood as "the levels and types of risk that an entity is willing to assume, determined in advance and within its risk-taking capacity, to achieve its strategic objectives and business plan⁸⁵", is a fundamental axis intimately linked to the business model.

In practice, and driven globally by regulators and supervisors⁸⁶, risk appetite is approved at the highest level in financial institutions, and is linked to goals on quantitative metrics and qualitative indicators (Fig. 17).

The link between risk appetite and the business model comes from two factors: on the one hand, the fact that a consistent risk appetite necessarily requires that business projections be challenged, in the sense that business projections should always be accompanied by their likely impact as well as an analysis of consistency with the risk appetite approved by the Board.

On the other hand, transposing risk appetite to each of the bank's activities is done through equivalent risk for large risks (treasury, big accounts) and through credit schemes by segment for retail risks (mortgages, consumer). In practice, this means that risk appetite permeates the entire business activity in the form of limits, objectives, incentives, transfer prices, etc.

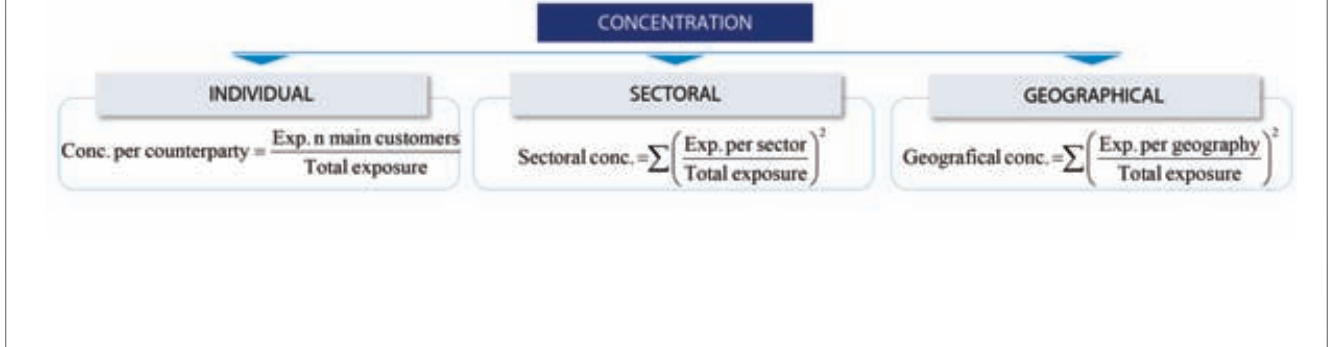
Both factors imply the need for the Risk and Business areas to work in unison, which is ultimately a critical factor in ensuring the sustainability of the bank's business model.

A specific case of special relevance within risk appetite is the quantification of concentration risk, which provides banks with an internal management tool that allows them to plan both their short term and their long term diversification strategy, as well as to define the lines of action in this area. Measuring this type of risk is based on establishing exposure distribution among the bank's clients under different drivers, with the most common being exposure by individual customer, by industry sector and by geographical area, but concentration is also measured by sources of funding, by specific business (e.g. real estate, shipping), etc.

⁸⁵BCBS (2015b).

⁸⁶BCBS, FSB.

Fig. 18. Example of concentration index applied to three areas



The most frequent quantification metric is the Herfindahl-Hirschman concentration index (HHI, Fig. 18), although there are no standard thresholds to determine what levels pose a high concentration risk.

In addition to the above, concentration indices are often used as part of other bank management processes and in banks' economic capital models.

RAROC and pricing

RAROC makes it possible to link the bank's results and capital. Following the development of quantitative models for measuring risk/capital, banks have started to integrate the so-called risk-adjusted return measures into the management process (fig. 19). These measures seek to place on a comparable basis (through risk adjustment) the profitability of business lines or business segments with very different risk profiles.

These metrics are used to support strategic business decisions: they are used to establish policies for the

distribution of capital among operating units, they act as a measure of normalization between these units, they are used for setting transaction prices according to their risk, etc.

Specifically, an essential objective of applying RAROC to pricing is to ensure that the price of transactions covers all costs (credit, financing and operating costs), as a mechanism to assess and ensure the viability of the business. This is closely linked to the IFRS 9 framework, under which it is understood that the price of a transaction considers credit risk at the time of its origination, and that a significant increase in this risk implies the need to provide for the entire life of the transaction.

From this perspective, the need to fine-tune the pricing-oriented elements of RAROC, in its three components: income, costs and capital, becomes particularly important (Fig. 20).

Fig. 19. General (simplified) expression of RAROC

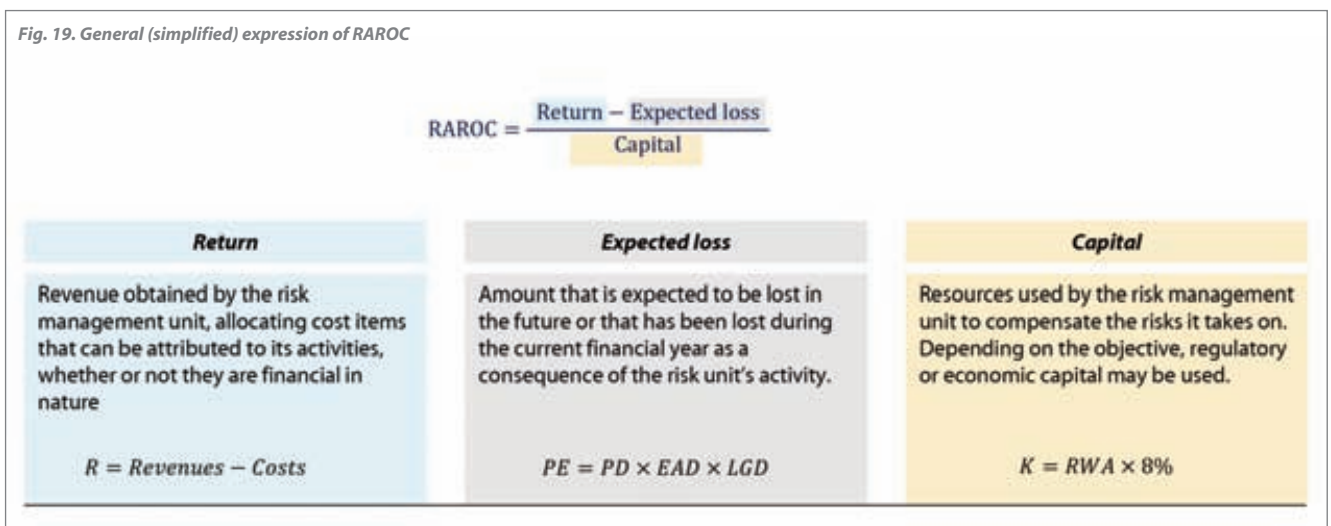
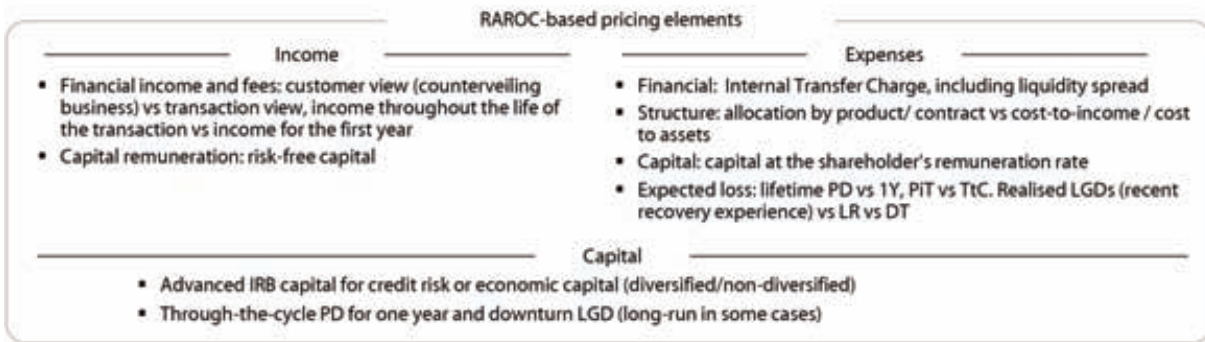


Fig. 20. RAROC-based pricing elements that need concretion



Efficiency

Efficiency is generally formulated through the cost-to-income ratio (CIR), whose expression is based on the link between expenses and income (Fig. 21). Each of the components in this ratio is, in turn, subject to detailed analysis.

Efficiency analysis is one of the key elements to measure business sustainability, and is widely used to determine a bank's strategy. Efficiency is a key lever for ROE sustainability, as numerous studies on the past crisis have shown. In this sense, the ECB already indicated in 2010 that:

An analysis of the efficiency of banks in managing their businesses indicates, for the sample, that the cost/benefit ratio of the less solid banks was close to 65%, compared to 55% for the more solid banks. At the time of the crisis, the less efficient banks struggled more quickly and consequently reduced staff levels to keep costs down, in line with the new financial environment.

And it is a fact that the most successful companies, which have achieved a better use of technology, are characterized by being considerably efficient⁸⁷.

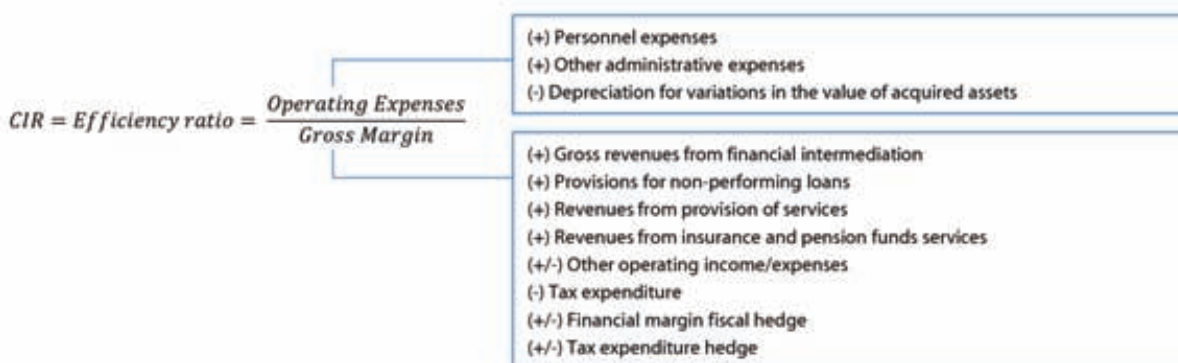
In this context, and as a result of the described environment of pressure on profitability, banks are intensifying their efficiency programs covering different areas: commercial efficiency, improvement of operational processes, organizational efficiency, cost optimization, etc.

Digitization

In the current environment, digital transformation is already a fact banks are facing. This context is characterized by (i) unprecedented speed (which could be described as exponential) of advances, unlike the more linear development of previous periods; (ii) the global reach of transformation, which affects all industries and countries; and (iii) the profound impact on the business model of all economic players.

⁸⁷As an example, Apple made the entire iPad adaptation of the Safari browser with only two engineers.

Fig. 21. General expression of the efficiency ratio and description of its most common components



Indeed, the capacity to generate, store and process information is increasing at an exponential rate (Fig. 22), as predicted by Moore's Law⁸⁸. Some evidence includes⁸⁹:

- ▶ The total volume of data in the world doubles every 18 months⁹⁰.
- ▶ Over 90% of the data that exist today were created in the last two years.
- ▶ The per capita capacity to store data has doubled every 40 months since 1980 and its cost has decreased by more than 90%.
- ▶ Processing capacity has increased 300-fold since the year 2000, making it possible to process millions of transactions per minute.

Therefore, being able to measure how an entity is transforming from a digital perspective, both in terms of fulfilling a planned strategy and due to environmental influence, becomes a fundamental element with an impact on business development itself.

In this respect, dashboards have been developed that make it easier to monitor these aspects and allow banks to objectively measure the success of incorporating digital components in terms of data, models, processes, new technologies, etc., into their business model.

Some examples of metrics used in the area of digital transformation are:

- ▶ Metrics on the level of progress made in relation to the distribution model, which analyze performance for initiatives to (i) prioritize customer relationship channels by client segment and transaction, (ii) develop management capabilities associated with each channel, and (iii) implement omnichannel processes.

▶ Metrics that evaluate the extent to which new technologies are applied to business processes to improve the customer experience (e.g. time and cost savings attributable to the use of technology, customer satisfaction measured through surveys as well as net promoter score (NPS) and customer abandonment rate).

▶ Indicators to measure the level of automation and control of operational processes (e.g. time-to-market, errors in processes), which lead to improved efficiency and a better customer experience.

▶ Metrics to analyze the use of information sources and the development of risk or business models using machine learning techniques (e.g. changes in the type and volume of processed data, predictive power of models, reduced modeling times and costs).

▶ Indicators on the level of progress made in the design and use of new architectures, measuring changes in the use and performance of big data systems to store structured and unstructured data in a single place, blockchain to provide immediacy and greater security, or the use of specific APIs to create new distribution models for products and services.

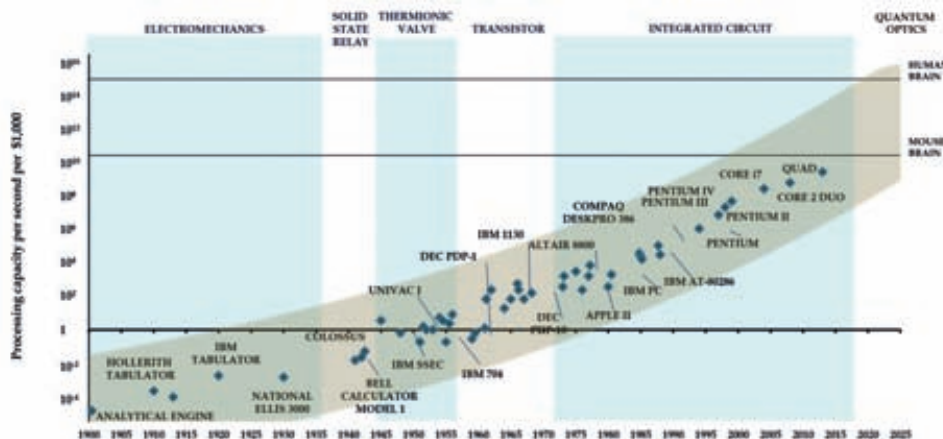
▶ Indicators on the level of development in terms of cybersecurity, looking at the management of IT risks associated with data security and system availability (e.g. prevented attacks, incidents in security audits), with a particular emphasis on the measures recommended by NIST to address this risk (identify, protect, detect, respond and recover).

⁸⁸Observation by Gordon Moore, co-founder of Intel, in 1965, that technology evolves so that the number of transistors in an integrated circuit doubles approximately every two years. Moore (1965).

⁸⁹Federal Big Data Commission (2014).

⁹⁰It is estimated that 2.5 exabytes of data are produced every day, a volume of information that is equivalent to 12 times all the printed books in the world.

Fig. 22. Moore's law: exponential growth of processing capacity per second and \$ 1,000



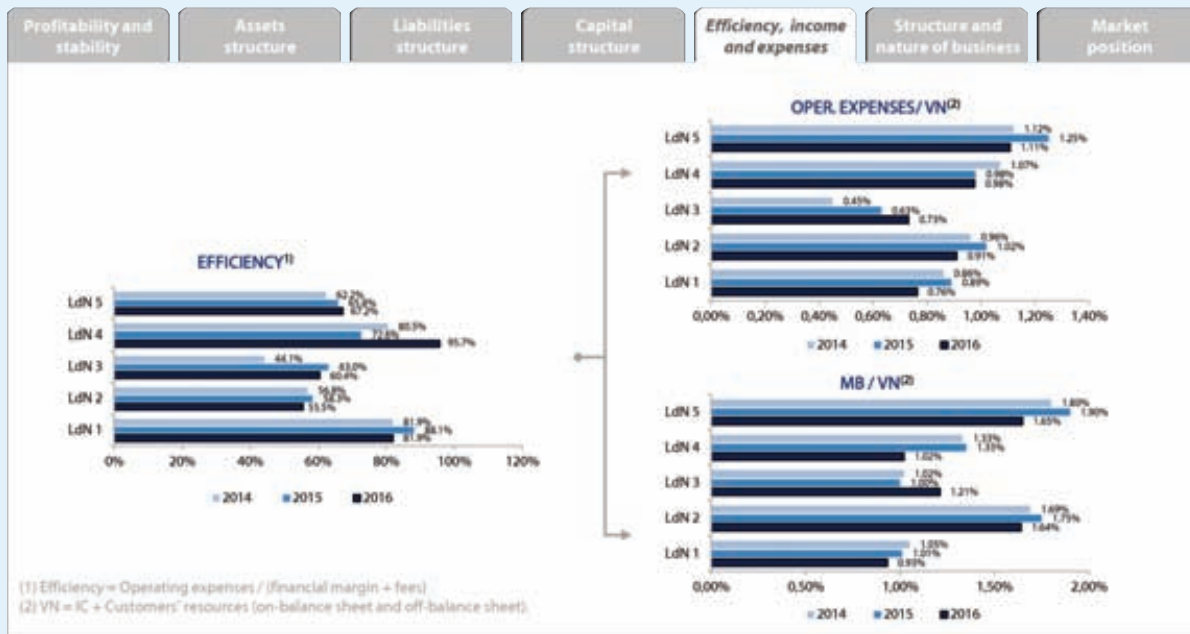
Source: Kurzweil (2014).

Dashboard for monitoring BMA-related indicators

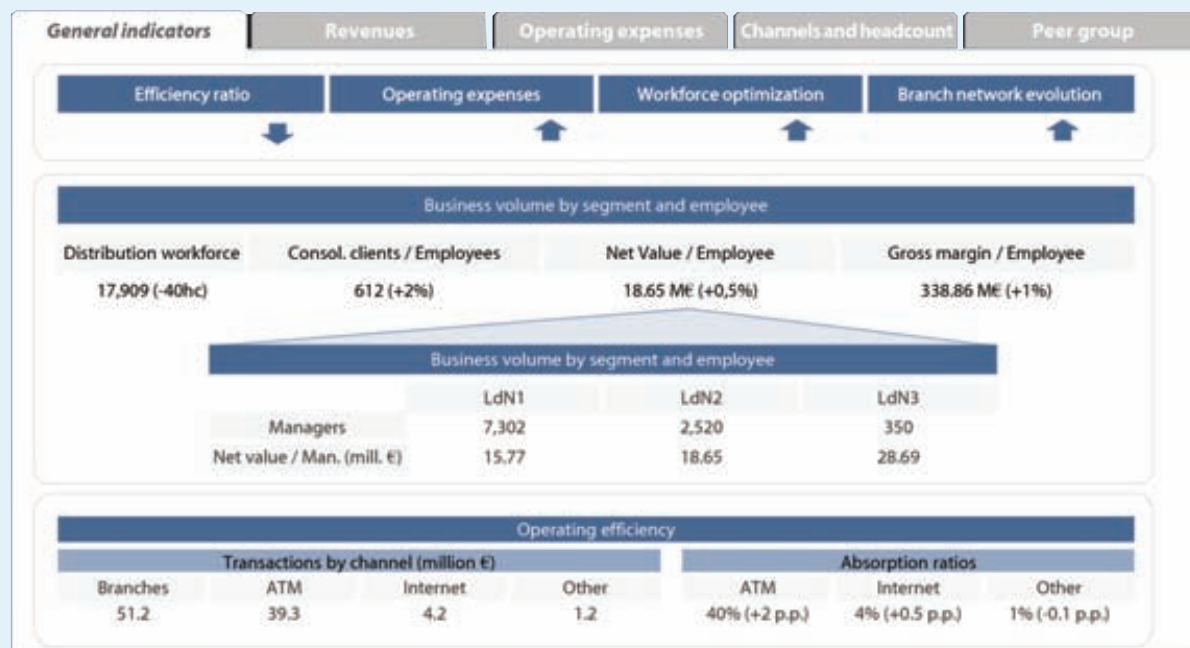
The outputs for the described methodologies can be split according to different axes, such as line of business, type of client and type of product, to create reports that show aggregated information on indicators for different categories, as well as ad-hoc reports.

In this way, creating a dashboard that brings together this information and allows the generation of periodic reports on the status of the above variables in relation to all their axes and divisions makes it possible to identify alerts on BMA-related indicators and, consequently, to design action plans that lead to mitigating actions and that allow analyzing the bank's short-term viability and medium-term sustainability in line with regulatory requirements through its SREP.

Example of BMA-monitoring reports



Example of business risk management dashboard





Benchmarking

An increasingly important method in BMA is comparative analysis or benchmarking. Supervisors, and in particular the ECB, consider it a fundamental tool for banking supervision in all areas – and in this respect there is a wealth of, for example, thematic reviews on specific aspects, such as the level of compliance with standards (BCBS 239, IFRS 9), and for gaining a comparative view; or for creating comparative reports based on COREP and EBA questionnaires for prioritizing the supervision of internal models for the calculation of RWA and capital, to cite two examples.

For banks, therefore, it is essential to have a comparative view of the different aspects of their business model, both for supervisory reasons (anticipating the supervisory response) and, above all, for management reasons.

These benchmark analyses usually draw on two sources:

- ▶ Public, freely accessible, such as annual reports, Pillar 3 reports, EBA Risk Dashboards, results from stress testing exercises and supervisory AQR's, etc.
- ▶ Private, which includes both payment sources (private databases, specialist supplier reports, etc.) and mystery shopping exercises to compare specific characteristics (prices, times, quality of service, etc.).

In short, benchmark analysis is a practice that, although not new, is increasingly widespread, and is becoming more systematic as methodologies for comparative analysis mature and become more structured.

Key challenges

As already mentioned, there are currently several types of methodologies that, although not specifically developed to cover business model analysis, constitute a set of elements that contribute to evaluating it.

However, in order to have a comprehensive BMA framework, there are still some open questions and challenges:

1. Clearly defining the governance and organization (roles and responsibilities) in the business model analysis process.
2. Setting the governance of data, models and information systems architecture as a top-level priority for the organization, to ensure banks evolve towards a business model aligned with the new technological, regulatory and competence environment.
3. Identifying all sources of information and storing potentially relevant support variables for business model analysis, ensuring their quality and integrity.
4. Integrating BMA methodologies in the management process, contributing to the development of real tools for strategic decision making by banks.
5. Finding a balance between statistical methods and expert criteria, allowing an alignment of analytical and business developments.



6. Determining a unified set of scenarios so as to obtain business risk projection results that are consistent and comparable to those achieved in risk measurement and capital and liquidity planning.
7. Seeking basic consistency in the management tools used by the bank's different areas (looking for their greatest common factor), thus striving for the necessary consistency of results, regardless of any particular uses they might be required for.
8. Implementing dashboards to periodically monitor performance indicators for the business model as well as the controls established to mitigate the associated risks.
9. Evaluating the possibility of developing methodologies to determine capital requirements based on business, or strategic, risk quantification (as an alternative to the quantitative scores).

Conclusion

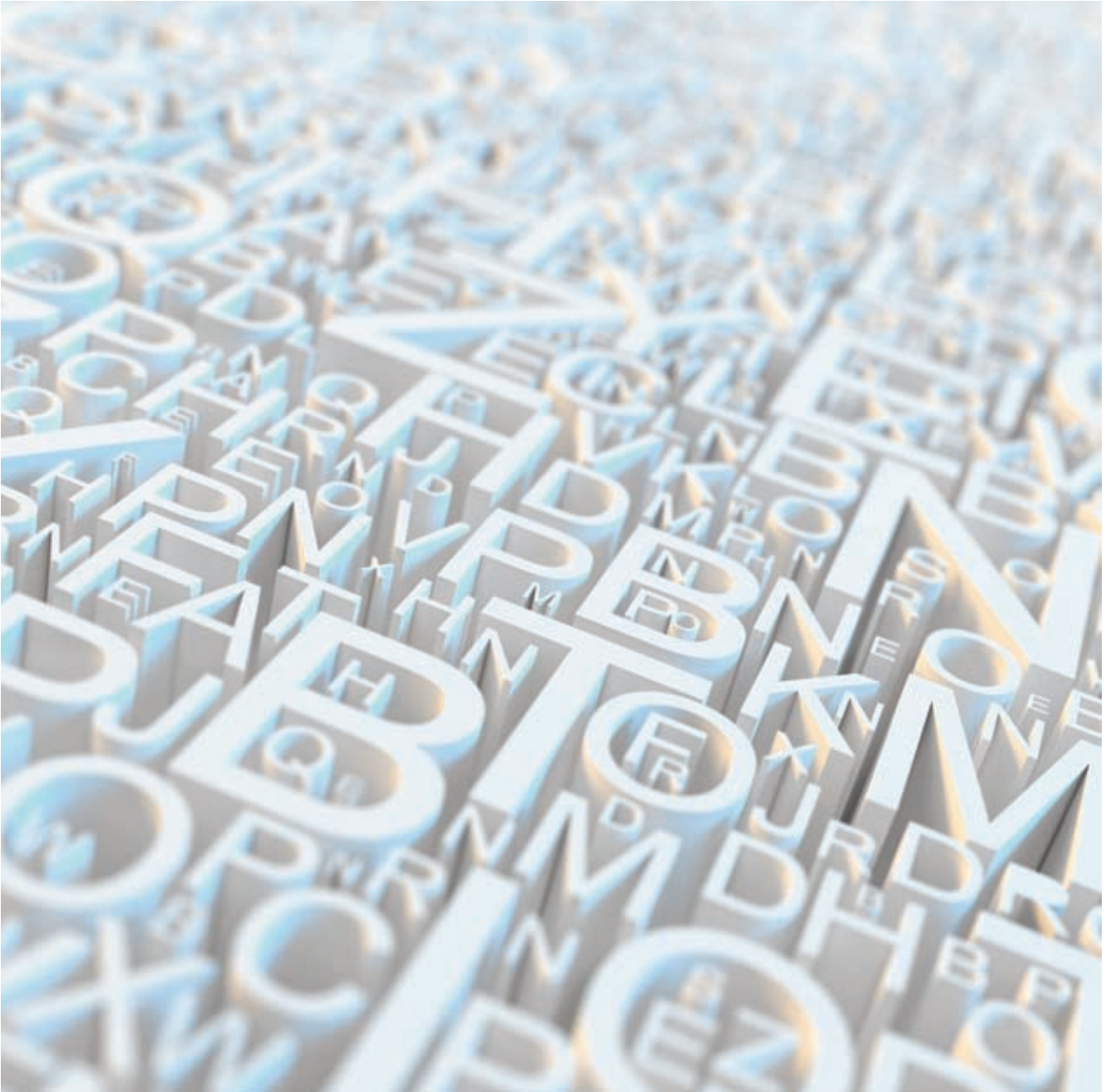
As we have seen in this analysis, BMA, understood as a method for evaluating the viability, sustainability and vulnerabilities of the business model, has received significant attention both by supervisors and managers, immersed in a context of profound changes that affect the way of doing business.

However, many questions remain open about BMA implementation: to what extent is it possible to evaluate the viability and sustainability of a business model using a quantitative score (as proposed by EBA, for example)? Is there an optimal profitability level? Are low profitability levels sustainable in business? What are the keys to ensuring the viability and sustainability of a business, especially when there are very relevant exogenous factors that can change the playing field very quickly? How much weight should be given to a bank's environment (industry, country, etc.)? Is it possible for a bank to manage systemic risks?

Despite all this, BMA is a useful and necessary exercise to regularly question business models, allowing banks to anticipate vulnerabilities and formulate solutions whose effectiveness can be monitored.

In any case, it is unquestionable that, in a context of so many and such rapid changes at all levels, BMA is more necessary than ever, beyond the requirements of regulators and supervisors, for banks to adapt to the new environment and, ultimately, to survive.

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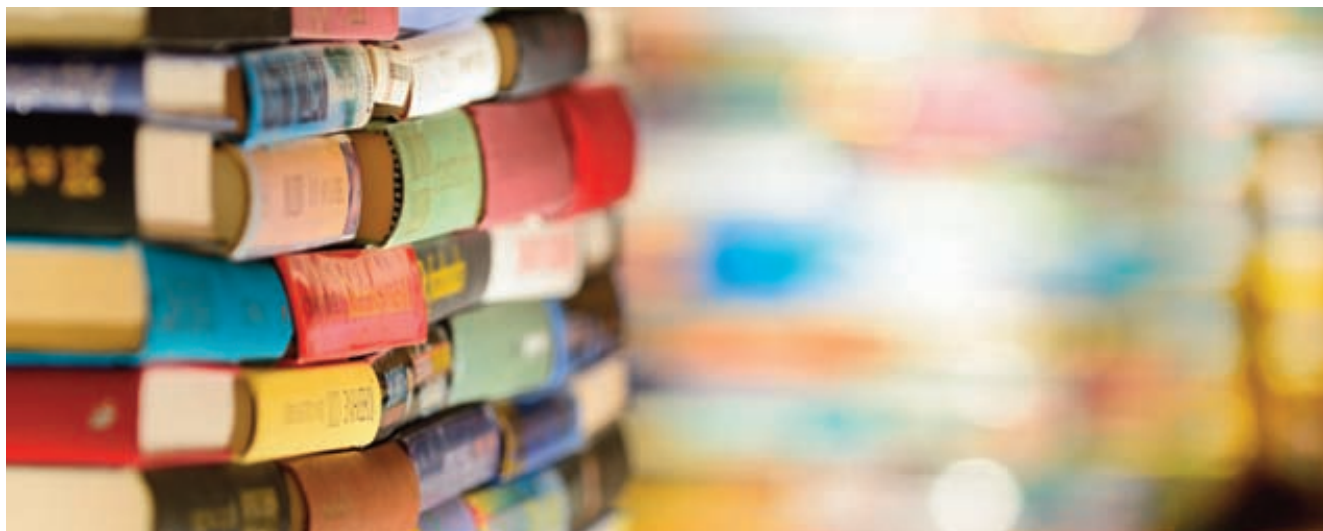
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Glossary



AML (Anti Money Laundering): refers to measures aimed at detecting, reducing and reporting money laundering and terrorist financing activities, issued at different levels and by different regulatory bodies.

AT1 and T2 (Additional Tier 1 and Tier 2): Banks' additional Tier 1 and Tier 2 capital, respectively, as defined under the Basel III framework.

AnaCredit: a project initiated by the ECB in 2011 and expected to be operational in 2018. It aims to set goals for collecting detailed and individualized information on bank loans in the euro area using harmonized rules for all Member States.

AQR (Asset Quality Review): an exercise to review the quality of banks' financial assets: its aim within the comprehensive assessment process was to improve the transparency of significant banks' balance sheets prior to the ECB taking on supervisory functions.

Asset Encumbrance: referred to in the Technical Implementation Standard (ITS) issued by the EBA in 2013, aimed at providing a harmonized measure for quantifying assets subject to collateralization across financial institutions.

Backtesting: a statistical technique that tests a model's predictive power by comparing the model's predictions with the actual observed values for the past period in question.

BBA (British Banking Association): association that groups the UK's main banks. It seeks to promote initiatives that favor the interest of banks as well as the public interest.

BCBS (Basel Committee on Banking Supervision): supranational body for the prudential regulation of banks. It aims to improve the quality of financial system supervision and promote standardization.

BCBS239 (Principles for effective risk data aggregation and risk reporting): set of principles issued by the BCBS whose purpose is to strengthen banks' risk data aggregation and risk reporting capabilities.

Big Data: amount of data whose size is beyond the capacity of classical data processing tools in terms of extraction, storage, administration and analysis. Usually also referred to as the capability to process and interpret massively generated data in new ways.

Blockchain: refers to shared ledger networks supported by combined technology that allows data to be managed by the different network participants in a decentralized way.

CCAR (Comprehensive Capital Analysis and Review): an exercise conducted by the Fed to assess the capital adequacy of the largest financial institutions in the US over the long-term, as well as to assess the adequacy of their capital planning process.

CEBS (Committee of European Banking Supervisors): independent body that used to be responsible for coordinating banking regulation and supervision in the EU. In 2011 the EBA took over its duties and responsibilities.

CET1 (Common Equity Tier 1): ordinary capital as defined under the Basel III framework. It consists mainly of the shares issued by the bank.

COREP (Common Reporting): EBA-defined regulatory reporting framework that standardizes the presentation of solvency reports.

Customer Journeys: a map of the customer's experience showing all of the customer's interactions and business transactions with the bank.

EBA (European Banking Authority): independent EU authority whose main purpose is to maintain financial stability within the Union and to safeguard the integrity, efficiency and orderly functioning of the banking sector. It was established on 1 January 2011 as part of the European System of Financial Supervision (ESFS) and absorbed the former Committee of European Banking Supervisors (CEBS).

EBF (European Banking Federation): European association which in turn represents other national banking associations. The EBF groups a total of 32 banking associations that, together, represent some 4,500 banks.

ECB (European Central Bank): central bank for the 19 EU countries that have adopted the euro. Its aim is to maintain price stability in the euro area. Since November 2014, it is also ultimately responsible for the supervision of financial institutions within the SSM.

EMIR (European Market Infrastructure Regulation): European Parliament and Council regulation which came into force in 2012 to regulate OTC derivative contracts, seeking to increase the transparency and security of these products through mandatory reporting to ESMA-authorized registers.

EWRM (Enterprise-Wide Risk Management): risk management approach based on identifying, measuring, monitoring and reporting the risks taken on by the bank during the course of its business in a comprehensive, granular and ongoing manner.

FATCA (Foreign Account Tax Compliance Act): A federal US law that requires financial institutions across the world to report all foreign accounts of US citizens to the US tax agency. Its purpose is to promote fiscal transparency.

FBF (Fédération Bancaire Française): an association that represents banks operating in France. It defines the position of the banking industry and promotes initiatives vis-à-vis the economic and financial authorities.

FCA (Financial Conduct Authority): responsible for regulating the conduct of institutions providing financial services in the UK. It seeks to promote effective competition among financial service providers, to ensure that markets operate properly and to protect consumers.

FDIC (Federal Deposit Insurance Corporation): an independent agency created by the US Congress to maintain stability and confidence in the financial system. Its mission is to secure the deposits of all member banks.

Fed (Federal Reserve System): The United States' central bank, founded in 1913 to provide the nation with a more secure, flexible and stable monetary and financial system. Over the years, its role in the banking and economic sectors has expanded to include activities such as directing national monetary policy, supervising and regulating banks and providing financial services to depository institutions.

Financial Stability Board (FSB): supranational body whose aim is to increase the stability of the global financial system through greater coordination between the national financial authorities.

FINREP (Financial Reporting): regulatory framework defined by the EBA to standardize the presentation of financial statements.

Fintech: refers to IT and other types of technology used in the banking and financial industries, usually in connection with startups and financial companies whose added value lies in technology.

FRF (Financial Reporting Framework) and RRF (Risk Reporting Framework): set of standards and criteria relating, respectively, to the publication and reporting of financial statements and to the publication and reporting of risk information by financial institutions.

Fundamental Review of the Trading Book (FRTB): revised BCBS framework on the minimum capital requirements for market risk, introducing changes to the standard approach (SA) and to the internal model approach (IMA) and reviewing the borderline between the investment portfolio ("banking book") and the trading portfolio ("trading book").

GBIC (German Banking Industry Committee): committee representing the main German banking associations.

G-SIBs (global systemically important banks): list of systemically important banks compiled by the FSB according to criteria such as size, interconnectedness, complexity, irreplaceability and global reach; the banks on the list are subject to stricter requirements and controls.

IAS 39 (International Accounting Standard): accounting standard setting out requirements for the recognition and measurement of financial assets and liabilities. This standard, superseded by IFRS 9 as of accounting periods beginning after January 2018, requires that provisions for credit risk impairment be accounted for under an incurred-loss model.

ICAAP (Internal Capital Adequacy Assessment Process): process of banks' self-assessment of capital adequacy.

IFRS 9 (International Financial Reporting Standard): accounting standard published by the IASB in July 2014. This standard, which will replace IAS 39 for accounting periods beginning after January 2018, requires that provisions for credit risk impairment be accounted for under an expected-loss model, in addition to other requirements.

ILAAP (Internal Liquidity Adequacy Assessment Process): internal process of liquidity adequacy self-assessment in the banking sector.

IMF (International Monetary Fund): an international organization that promotes financial stability and international monetary cooperation, seeking to facilitate international trade, promote high employment levels and sustainable economic growth, and reduce poverty.

IRB (Internal Rating Based): an advanced regulatory capital calculation method based on internal rating models. To access it, banks need to meet a set of requirements as well as to obtain supervisory approval.

LCR and NSFR (Liquidity Coverage Ratio and Net Stable Funding Ratio): liquidity requirements for banks under the Basel III framework. The LCR requires that banks hold a sufficient level of highly liquid assets to cover net cash outflows in a 30-day stress scenario; while the NSFR requires that banks maintain a stable funding profile in terms of asset composition.

Machine Learning: artificial intelligence and computer science-related scientific discipline through which complex patterns are identified within large data volumes by means of examples, experience or instructions.

Single Supervisory Mechanism (SSM): a mechanism created in 2014 to take on the supervision of European financial institutions. It is composed of the European Central Bank and the competent national supervisory authorities of the different euro zone countries. Its main aims are to ensure the strength of the European banking system and to increase financial integration and security in Europe. It conducts direct supervision of the approximately 130 most significant banks, and indirectly supervises close to 3,000 less significant institutions.

MiFID and MiFIR (Markets in Financial Instruments Directive and Markets in Financial Instruments Regulation): Directive and Regulation approved within the EU framework to ensure that financial markets are safer and more efficient and investors are better protected.

Model Risk Management (MRM): refers to the management of model risk, which is defined as the potential risk of negative consequences arising as a result of incorrect decisions made based on the outcome of models.

MoU (Memorandum of Understanding): agreement between two or more parties describing the terms and details of an understanding, including each party's requirements and responsibilities. For instance, in relation to the SSM, EU Member States whose currency is not the euro and do not wish to participate in the SSM could set up a MoU with the ECB for the latter to undertake supervision of cross-border banks.

MREL (Minimum Requirement for Own Funds and Eligible Liabilities): minimum requirement for own funds and liabilities eligible for bail-in.

NCUA (National Credit Union Administration): independent federal agency created by the US Congress to regulate and supervise federal credit unions.

OCC (Office of the Comptroller of the Currency): a US federal agency responsible for the regulation and supervision of national banks, federal offices and foreign bank agencies. Its main purpose is to ensure they operate safely and soundly, and comply with all regulatory requirements, including fair and impartial treatment of clients and fair access by customers to the financial market.

Over-the-Counter (OTC) and Exchange-Traded-Derivatives (ETD): OTC derivatives are those traded directly between two parties, while ETDs are standardized derivatives whose value depends on an underlying asset traded on an organized market.

PRA (Prudential Regulation Authority): responsible for the regulation and prudential supervision of a number of UK banking institutions, building societies, credit unions, insurers and large investment firms. Its objectives are set out in the Financial Services and Markets Act 2000 (FSMA) and include promoting the safety and soundness of firms, protecting policyholders and facilitating effective competition.

PPNR (Pre-Provision Net Revenues): net income before loan loss provision adjustment.

Price-to-Book: ratio of a company's or an instrument's market value to its book value.

RAROC (Risk-Adjusted Return On Capital): profitability ratio that is calculated as the ratio of return relative to capital for a transaction, customer or, usually, an operating unit. The numerator components of RAROC are margin, costs and expected loss, whereas the denominator is the capital facing the risks.

RAS (Risk Assessment System): a tool used for internal supervisory purposes that provides insight to aid the supervisor in the supervisory review and evaluation process (SREP).

RIA (Risk Identification Assessment): evaluation process to assess the combination of the probability of a negative event occurring and the impact once the negative event occurs. Its main components of analysis are risk, exposure and vulnerabilities.

Ring-fencing: the financial segregation of a company's assets, usually carried out for tax, regulatory or security reasons. In the financial industry, it refers to the legal separation between the wholesale and the traditional banking business as a measure to protect depositors.

RWA (Risk Weighted Assets): the (on or off-balance sheet) exposure weighted by the risk it represents for the bank, calculated according to the methods established by the regulator.

Shadow banking: mainly refers to non-banking and usually non-regulated financial institutions that provide credit and other similar financial services.

SREP (Supervisory Review and Evaluation Process): supervisory review and evaluation process. Its purpose is to ensure that financial institutions have adequate processes, capital and liquidity to ensure sound risk management and sufficient risk coverage.

STE (Short Term Exercise, formerly SPE): data collection exercise conducted by the ECB that complements ITS-related exercises and reports (FINREP and COREP) with a focus on liquidity and sovereign risk.

Stress test: a simulation method used to determine a bank's resilience to an adverse financial situation. In a broader sense, it refers to any method for assessing the ability to withstand extreme conditions, and can be applied to banks, portfolios, models, etc.

TLAC (Total Loss Absorbing Capacity): requirement aimed at ensuring that, in the event of resolution and immediately thereafter, global systemically important banks (G-SIBs) have the capacity to maintain critical functions without putting taxpayer funds or financial stability at risk.

TRIM (Targeted Review of Internal Models): SSM initiative to review Pillar 1 models approved by banks with a view to restoring their credibility and harmonizing the criteria for approval.



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