Fundación MAPFRE

INSURANCE SOLVENCY REGULATION SYSTEMS OUTLOOK

MAPFRE Economics

Insurance Solvency Regulation Systems Outlook

An Updated Analysis of Progress Toward Risk-Based Regulations

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Presentation

The insurance industry, as part of the financial sector, is linked to virtually all areas of economic operation. It works to protect the different sectors of the economy from risks through a broad variety of insurance products, provides stability and continuity to the economic process when catastrophic events occur, and stimulates and enables the performance of many business activities and transactions, both domestic and foreign. From the perspective of the households, insurance provides stability for personal and family income through the protection and compensation that Life Protection, Savings, Accident, Health, Home, and Auto insurance, among others, offer. Thus, due to its nature and economic impact on society, the insurance industry's activity is subject to prudential supervision, with greater public intervention than in other sectors.

A modern and efficient regulatory and control framework, which the various national and supranational supervision bodies have been refining over the years, is necessary to make the insurance industry more resilient and better prepared for future challenges, protecting policyholders, providing stability to the industry, and avoiding major losses due to poor risk management. In fact, since Fundación MAPFRE published the report prepared by MAPFRE Economics on insurance solvency regulation systems in 2018, there has been some progress toward the implementation of risk-based regulation, which this new report analyzes in certain regions of the world, along with the outlook on pertinent global initiatives.

Fundación MAPFRE is therefore pleased to present the report *Insurance Solvency Regulation Systems Outlook: An Updated Analysis of Progress Toward Risk-based Regulations*, prepared by MAPFRE Economics, which updates and supplements the previously published report. We hope its publication enriches the existing documentation on regulatory matters and serves as a reference for those interested in this topic.

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Introduction

In 2023, the threat of crises in some small and medium-sized banks in the United States and in defined benefit pension funds in the United Kingdom, along with the problems that led to the demise of Credit Suisse, highlighted the importance of having risk-based regulatory systems in place, as well as adequate mechanisms for managing systemic risk. The swift intervention of regulators and supervisors in these countries prevented the problems of these institutions from spreading to the rest of the financial system, highlighting the progress made in terms of effective measures and agile responses to control systemic risk since the last global financial crisis in 2008.

It is well known that prudential regulation in the financial system has been subject to a continual adjustment process over the last decades, with the common denominator being the progression towards risk-based systems that seek to align public-interest objectives with the creation of incentives to obtain comparative advantages (in a pro-competitive environment), based on the quality of financial institutions' risk management. In this context, based on the analysis of the characteristic regulatory frameworks in certain regions of the world (United States, Latin America, Asia-Pacific, and the European Union), as well as global initiatives in this area, this study analyzes the prudential regulations applicable to insurance companies and their groups since the last assessment in the report MAPFRE Economics published in 2018 (with information as of 2017). It incorporates the progress achieved since then in moving towards risk-based regulation, using the Risk-Based Regulation Proximity Index (I-RBR) for this purpose.

Finally, based on the study results and from a public policy perspective, the report elaborates on the set of institutional and market preconditions that must be met in order to achieve further progress in the implementation of risk-based regulations in the insurance industry. In this sense, the report points out that moving forward on the implementation of this type of regulatory system before these preconditions are met may limit the benefits of its introduction and, under certain conditions, even produce undesired effects that hinder the operation of the insurance market.

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Executive summary

The small and medium-sized bank crisis in the United States and defined benefit pension fund crisis in the United Kingdom in early 2023, along with the issues that led to the demise of Credit Suisse, once again highlighted the importance of having proper risk-based regulatory systems in the financial system, adequate risk management for interest rate fluctuations and financial risks in general, and suitable mechanisms for systemic risk management. At that time, the swift intervention of the U.S. Federal Reserve, Bank of England, and Swiss National Bank prevented the spread of the problems encountered by these institutions to the rest of the financial system, highlighting the significant progress made with systemic risk control measures and agile responses since the last global financial crisis following the Lehman Brothers bankruptcy in the United States (2008) and subsequent sovereign debt crisis in Europe (2012). However, it also called attention to the risk of not strengthening regulatory frameworks, as well as the measures necessary for their implementation, to avoid the moral hazard that these interventions may generate and, ultimately, the recurrence of such events.

Along these lines, over the last few decades, prudential regulation in the financial system (and that applicable to the insurance industry) has been subject to a continual adjustment process, with the common denominator being progression towards risk-based systems that seek to align public interest objectives with the creation of incentives to obtain comparative advantages (in a pro-competitive environment), based on the quality of financial institutions' risk management. As a result, risk measurements have become increasingly sophisticated, an essential factor in determining capital risk weights and incorporating complementary pillars to the quantitative requirements (strengthening governance and market discipline), in order to help maintain the solvency and integrity of the financial system. As part of this strategy, the organizations that bring together financial supervisors (the Basel Committee on Banking Supervision, International Organization of Securities Commissions, and International Association of Insurance Supervisors) were called upon to explicitly push forward in defining regulatory and supervisory standards that their members could adopt.

Regulation of insurance activity

Thus, although regulation of the insurance industry was traditionally a task confined to domestic markets, the reality of global markets soon made it advisable to move towards increasing levels of regulatory consistency, with a tendency in recent years to come together on conceptual elements common to the rest of the financial system. In the scope of insurance, there have been three relevant dimensions to this global initiative. The first consisted of the International Association of Insurance Supervisors (IAIS) drafting regulation and supervision principles and standards, which have gradually been implemented by member countries of that standard-setter organization. The IAIS's plan to establish an Insurance Capital Standard (ICS), which is expected to be implemented in 2025 (under the name of Prescribed Capital Requirement, PCR), falls within this context. The second dimension, at the regional and principal markets level, was the determi-

nation to modernize existing solvency regulation systems. This framework gave rise to the European Solvency II plan, the Solvency Modernization Initiative (SMI) by the NAIC in the United States, and the development of the Swiss Solvency Test, among others. And the third of these dimensions, following the financial crisis unleashed in 2008 with the collapse of Lehman Brothers in the United States and subsequent sovereign debt crisis in the European Union, was the determination to implement macro-prudential surveillance measures in order to limit potential systemic effects derived from insurance activity, thereby helping to maintain global financial stability.

Main features

In the case of insurance companies, these new solvency frameworks toward which the various markets are moving are intended to address four fundamental elements. First, from a quantitative perspective, a set of capital requirements, technical provisions, investments, and reinsurance that guarantee insurance companies' financial position. Second, a series of governance standards that promote more professional (risk-based) management by companies, based on the belief that this is a contributing factor in limiting the probability that a company will become insolvent. Third, the correlative easing of some prudential regulatory standards that could impact competition and innovation, and therefore the market's efficiency, such as those that regulate products that could be brought to market and their conditions (structure and price), notwithstanding their subsequent review by the supervisor (the paradigm in this sense is the Solvency II legislation). And finally, a series of standards on transparency and information disclosure to the market, which seek to improve how the market discipline mechanism works, as an additional element to stimulate companies' management to reduce the likelihood of insolvency.

Thus, systems further developed towards a purely risk-based prudential regulatory system (such as Solvency II or the IAIS ICS) are characterized by a greater number of risk factors considered by prudential regulation. They introduce more complex scenario simulation techniques for calculating certain specific capital risk weights for underwriting, market and credit risk, consideration of risk interdependence and, in some cases, the use of internal models or calculation of regulatory solvency capital at group level. These systems usually include explicit risk assessment measures, with a predefined time horizon and confidence level, such as value at risk (VaR or tail VaR), which would apply both in the calculation of capital under standard formulas, when the applicable factors or scenarios are calibrated under this explicit measure, or by applying internal models. Finally, these more modern systems are characterized by imposing neither limits on the list of assets in which insurance companies may invest beyond a general "prudent person" principle (the only limit usually refers to the use of derivatives on a speculative basis), nor regulatory requirements for investment dispersion. These aspects must be controlled within the framework of their own investment policies, taking into account that investments incorporating a higher risk component and higher concentrations will require higher capital risk weight and, in a broader sense, are part of the company's risk management process. Again, the paradigm in this sense is the Solvency II legislation.

The solvency prudential supervision framework in place in the European Union (Solvency II), as well as the ICS, prepared by the IAIS and now being finalized, well reflect the model followed in modern risk-based solvency systems with quantitative requirements that establish the standards for calculating the solvency ratio by dividing eligible own funds by the solvency capital requirement. On the side of eligible own funds to cover capital requirements, the most modern systems follow a comprehensive approach to economic valuation of surplus considering the total balance sheet approach, in which assets and liabilities

(and, alternatively, the surplus) are valued in a market-consistent manner. In the case of obligations arising from insurance contracts, this gives rise to a calculation based on a best estimate and a risk margin that aligns their valuation with an unforced transfer price between independent parties. It also opens up the possibility for insurance companies to issue hybrid financing instruments that can be used (subject to certain limits) to strengthen their solvency position, and are considered according to the degree of loss absorption they allow in situations of non-compliance with regulatory capital requirements and/or in cases of insolvency (quality of the capital instruments or "tiering").

Meanwhile, the risk-based solvency capital requirement (SCR) is calculated modularly, normally calibrated according to a one-year value at risk (VaR) methodology with a 99.5% level of confidence. Internal models may alter the modular structure of the standard formula or the aggregation matrices constructed based on their own calculation of the risk correlations, but not the confidence level based on any of the VaR or tail VaR calculation methodologies. In a system that approximates a pure risk-based model, prudential margins would not be considered in the valuation of assets and liabilities, to the extent that such margins are taken into consideration exclusively for the purpose of calculating regulatory capital, with the determined metric (VaR, tail Var) and not when calculating eligible own funds.

Precautionary and intervention measures, provided for in the event of solvency impairment of insurance companies or their groups, are usually designed in the form of an intervention ladder, depending on the severity of the situation. A solvency ratio of less than one would result in the supervisors taking precautionary measures. In some systems, like the NAIC standard in the United States, measures are considered even in earlier phases, when the ratio begins to deteriorate, even if it is not yet less than one. In the Solvency II system, there is a second intervention level of another magnitude, called the minimum capital requirement (MCR), which is calculated quarterly, and when not satisfied results in the adoption of more urgent and severe measures by the supervisors.

Report and Risk-Based Regulation Proximity Index

This study provides an updated and more thorough discussion of these aspects, based on an analysis of the characteristic regulatory frameworks in certain regions of the world (United States, Latin America, Asia-Pacific, and the European Union), as well as pertinent global initiatives. To that end, this report looks at the prudential regulations applicable to insurance companies and their groups in countries around the world, and their changes since the last assessment in the prior version of this report (published by MAPFRE Economics in 2018, with 2017 information), in order to incorporate the progress made since then in the progression toward risk-based regulation. As in the previous study, the analysis considers a total of twenty-three relevant factors that characterize the different solvency regulation systems, which are presented, to a greater or lesser extent, based on how much these systems have evolved towards pure risk-based systems. A synthetic indicator is constructed based on these factors, called the Risk-Based Regulation Proximity Index (I-RBR). It is important to note that the I-RBR is in no way intended to classify the efficiency or quality of regulations, or the effectiveness of a market's supervision, but rather exclusively measures the transition process of regulatory frameworks toward risk-based regulations, both to establish capital risk weights and to consolidate their improved management, based on the terms set forth in the respective regulations.

In this respect, the analysis shows that some emerging markets are still making progress in terms of qualitative requirements in insurance companies' risk management (Pillar 2, under the Solvency II

system), although the quantitative requirements (Pillar 1) are still essentially based on Solvency I-type regulatory systems. Under this framework, the determining factor of the capital requirement is defined by the underwriting risk, with a system based on one or more factors applied to magnitudes considered to be representative of the level of exposure to insurance risk, such as premiums, loss ratio (in Non-Life insurance), or mathematical provisions and/or capital at risk (in Life insurance). In order to control other risks, such as financial risks, several additional governance and investment standards, specific regulatory limits on diversification and dispersion, and a closed-list classification of assets suitable to support the obligations arising from insurance contracts are introduced. This framework is usually completed, in some markets, with the obligation to perform certain adequacy tests of the assets backing long-term insurance obligations, based on flow projections, discounted with risk-free yield curves.

Preconditions for progress toward risk-based regulations

In any case, the possible difficulties associated with insurance companies and supervisory authorities using purely risk-based prudential regulation should be considered when, due to the features of their markets, they are unlikely to have an adequate infrastructure to fully implement these systems. It is notable that in countries with relatively small markets, steps have been taken to implement governance requirements with a division of responsibilities in which the risk function takes on a relevant role in the direction and management of insurance companies, which should be assessed positively. While it is true that risk-based regulatory models can improve insurance market performance, they are more complex models that require, as preconditions, the existence and development of new institutional and market infrastructure. Therefore, they involve lengthy design, implementation, and internalization processes.

Thus, especially in emerging markets, the first phase of implementing risk-based regulations involves developing these institutional and market preconditions, which requires medium-term coordinated effort between the financial authorities and insurance industry. The existence of institutional and market preconditions that allow the risk management function to be carried out effectively and efficiently determines the speed and likelihood of further progress of this type of regulatory model in the different markets. Moving forward to implement this type of regulatory system before these preconditions are met may limit the benefits of its implementation and, under certain conditions, even create undesired effects that hinder the operation of the insurance market.

1. Conceptual framework

1.1 Regulation and market failures in the financial system

Dynamics of financial regulation

Following the conceptual framework set out in our initial study on the subject,[1] and from a conceptual perspective, prudential regulation of financial activities is intended to protect the *public interest* in terms of compensating for certain *market failures* (inefficiencies linked to aspects such as asymmetric information, the existence of market power, and the generation of negative externalities) that could affect it. In this context, the application of the corresponding regulatory measures, which involve a certain degree of "interference" with the market's operation, may impact participants' behavior and consequently financial services supply and demand.

Over the last few decades, prudential regulation in the financial system (along with those applicable to the insurance industry) has been subject to an ongoing adaptation process. Undoubtedly, the common denominator of this process has been progress toward *risk-based systems* which are able to align the goals of protecting the public interest with the creation of stimuli to obtain efficiency and comparative advantages (in a pro-competition environment), based on the quality of risk management by financial institutions.

From a short-term perspective, the small and medium-sized bank crisis in the United States and defined benefit pension fund crisis in the United Kingdom in early 2023 once again highlighted the importance of having proper risk-based regulatory systems and adequate management of interest rate variation risks and financial risks in general. In this particular case, the swift intervention of the Federal Reserve and Bank of England prevented the problems of these institutions from spreading to the rest of the financial system. This highlighted the great progress that has been made in terms of measures and agile responses to control systemic risk since the last global financial crisis following the Lehman Brothers bankruptcy in the United States (2008) and the sovereign debt crisis in Europe (2012). These, together with the disappearance of Credit Suisse, are only recent examples of a series of financial crises that continue to remind the international financial community that globalization, while enhancing the productive capacities of the world's economies through increased interdependence, can also lead to financial crises in domestic markets having an impact on the international financial system due to that interdependence. This was confirmed by the financial crises in Mexico (1994), Asia (1997), Russia (1998), Argentina (1999), and Turkey (2001).

Since the progression of the financial globalization process, the response of international organizations has been to deploy a wide-ranging process of standardization of financial regulations and supervision practices. By doing so, they aim to establish minimum levels of vigilance and control to reduce the probability of critical situations arising in local financial systems which, as a result of the growing interdependence of this activity, would spread to the international financial system. Thus, risk measurements have become increasingly sophisticated, an essential factor in determining capital risk weights and incorporating complementary pillars to the quantitative requirements (strengthening governance and market discipline), in order to help maintain the solvency and integrity

of the financial system. As a result of this strategy, the organizations that bring together financial supervisors (the Basel Committee on Banking Supervision, International Organization of Securities Commissions, and International Association of Insurance Supervisors) were called upon to explicitly push forward in defining regulatory and supervisory standards that their members could adopt. The main goal is to prioritize, as a tool, the adequate measurement and management of the risks associated with these activities.

Since then, financial regulation has evolved to keep pace with the globalization process and greater economic and financial interdependence. This regulatory progress has been led by banking regulators who in the late 1980s introduced, through the Basel Committee on Banking Supervision (BCBS), what would become the first global risk-based prudential regulatory framework, the so-called Basel Accord (later ratified as Basel I). This first accord, initially adopted by the governing bodies of the central banks of the main developed economies (Belgium, Canada, France, Germany, Italy, Japan, Holland, Luxembourg, Spain, Sweden, Switzerland, United Kingdom, and United States), was very quickly adopted as an international standard implemented by practically all the world's economies.

Basel I was followed by other refinements to the global banking regulatory framework that resulted in the Basel II (2004) and Basel III (2010) accords. All of them used increasingly evolved and sophisticated risk measurements as an essential factor in determining capital risk weights and incorporated complementary pillars to the quantitative requirements (strengthening governance and market discipline) to help maintain the banking system's solvency and integrity. Currently, the BCBS continues to implement adjustments to the global regulatory framework for credit entities. The goal of this reference regulatory framework, along with its final reforms (known as Basel IV or Basel 3.1), is to strengthen the regulation, supervision, and risk management of banks to prevent financial crises like that experienced in 2008. And, although it has not been fully implemented as of late 2023, significant progress has been made in its adoption in the various jurisdictions, with varying degrees of progress in its implementation. The European Union and United Kingdom hope to implement these standards as of January 1, 2025, followed by a gradual five-year introduction period for some of the minimum requirements, while the United States is about to begin the consultation period for their application. In turn, Canada and Australia have already started to implement them, while China, Hong Kong, Japan, and Singapore have established deadlines to do so in 2024. In Latin America, Brazil has incorporated the Basel III reforms, with the operational risk capital requirements in 2024, after the adoption of the standardized credit risk focus. Meanwhile, Peru expects full implementation during 2024, with a gradual introduction that will be completed by 2027.

However, it is worth mentioning that the implementation of Basel III has raised some controversial issues that may lead to deviations from global standards, due to the possible adaptations of some jurisdictions to regional specificities. These issues include the minimum requirement under Basel III, which requires risk-weighted assets of internal models to be no less than 72.5% of those derived from the standardized approach, and its application at the group level. The impact on exposures to unrated small and medium-sized companies is also under discussion, as well as proportionality issues for smaller financial institutions. The debate centers on whether smaller banks should be subject to less stringent requirements, given their risk profiles and operational scales.

The use of internal models to implement Basel III has also been a source of considerable debate. In 1996, Basel I introduced the use of internal models to calculate regulatory requirements for market risk. This approach was extended in Basel II to include credit risk and operational risk, under the

premise that banks' sophisticated internal models could better reflect the actual risks involved in banking activities than the general model could. However, the 2008 financial crisis highlighted weaknesses in the models, and consequently Basel III introduced additional restrictions and requirements for the use of internal models.

To sum up, all these issues, which are reproduced to a greater or lesser extent in other areas of financial regulation (such as in the insurance industry's case), highlight the complexity of implementing a uniform set of regulations in a diverse financial landscape in which regional specificities and different market structures play an important role in shaping regulatory approaches.

Insurance activity and economic performance

Insurance companies fulfill a dual role in the economy. On one hand, they are an instrument that permits risk to be mutualized, thereby avoiding or reducing the economic consequences of the impact of specific insurable events. And, on the other, insurance companies constitute significant institutional investors who collaborate in the savings-investment process in the medium and long-term. In particular, this activity involves receiving and managing a significant amount of financial resources, making it a business subject to prudential supervision worldwide, similar to the activities carried out by all other financial institutions.

The *risk protection and compensation process* carried out by the insurance industry constitutes essential support for the operation of the different sectors of the real economy (primary activities, industry, and services), through the wide variety of liability and property and casualty insurance. Furthermore, insurance provides stability and continuity to the economic process in the event of catastrophic events, helping the economy to normalize its operations in relatively short periods of time. It also stimulates and enables multiple business activities and transactions, both domestic and foreign. And, from the perspective of households, insurance activity provides stability for personal and family income through the protection and compensation provided by Life Protection, Accident, Health, Home, and Auto insurance policies.

Meanwhile, in its *role as institutional investor*, insurance activity supports the savings and investment process. Thus, through Life insurance with savings components (both Life Protection and Life Investment), the insurance industry contributes to the creation of internal savings in the economy and, through its role as an institutional investor, to the process of capital formation. In this sense, the insurance industry is one of the main institutional investors at a global level, a function through which it not only channels savings to the financing of production activities, but also (due to the features of its business model) provides the economic system with an element of anti-cyclical stabilization.

For these reasons, an impact on the operation of the insurance industry, as with the financial system as a whole, may have an effect on the efficiency with which the various economic activities to which it is linked are conducted. Thus, given the importance of preserving the proper operation of insurance markets due to the public interest they entail, this activity is also subject to regulatory frameworks intended to help the insurance industry preserve parameters of financial strength and solvency.

Prudential regulations: conceptual basis

The financial markets are subject to the existence of what are known as *market failures*. These are situations in which resources are assigned through pure market mechanisms that could be inefficient under certain circumstances. Recognizing these failures is one of the main reasons that justifies government intervention in the financial markets, seeking to avoid

distortions that could affect the efficiency of general economic performance. As stated above, because it not only receives and manages third-party financial resources, but also plays a significant role in other aspects that could generate disruptions in economic performance, insurance is one of the activities subject to prudential regulation and supervision, as well as ordered resolution mechanisms at an international level, as occurs with activities conducted by all other financial institutions.

There are three *market failures* that are often associated with the performance of the financial system, thus justifying the presence of regulation and supervision: (i) the phenomenon of *asymmetric information*; (ii) the possible existence of *market power*; and (iii) the creation of *negative externalities*. In the first case, the phenomenon of *asymmetric information* occurs when the information buyers or sellers have is somehow deficient, because it is either incomplete or inaccurate. In general, the customers of financial institutions are typically considered to have incomplete information regarding the products they intend to acquire, and about the financial condition of the companies offering them. This creates a situation of asymmetry that may lead to inefficient allocation of resources from the general perspective of the economy, since consumers are not in a position to discriminate between the features of products offered to them, or the financial strength of the institutions backing them.

In the second case, a potential *market power* situation occurs when the seller (or the buyer, as applicable), based on their size or operating conditions, can exercise significant control over product prices. This can happen in the absence of a competitive market (derived from excessive concentration), or due to the presence of practices that restrict or limit competition. The problem of market power may also increase if, for any reason of public interest, the government creates barriers to entry or prices controls over products.

Finally, *negative externalities* are created when service providers impose costs (not compensated with that service) on others, which manifest when an entity goes bankrupt or must exit the market. Due to the nature of their function, the failure of financial institutions entails costs not just for their shareholders (who lose their invested capital), but also for their customers (who could lose part of their equity being managed by the institution), and in a broader sense, costs associated with the systemic impact of financial activity in terms of product/income for the real economy in general.

1.2 The logic behind government intervention in the financial markets

In order to reduce the impact of these market failures on the financial system, the economy, and society in general, governments typically use three public policy instruments: (i) *regulation of market behavior*; (ii) *economic competition policy*; and (iii) *prudential regulation* of financial matters. First, the goal of regulation of market behavior is to control the behavior of intermediaries from financial firms and their agents toward consumers. Competition policies, which usually take form in antitrust laws and regulations, seek to prevent certain behaviors by financial institutions that substantially affect competition. And, finally, the goal of prudential regulation is to control and monitor the financial condition and solvency of financial institutions, in order to reduce their probability of failure. In the next section, we analyze the main instruments used to moderate the effect of these market failures from a public policy perspective.

Asymmetric information

There are basically two public policy instruments used to deal with the problem of *asymmetric information*. The first is regulation of market behavior, and the

second, prudential regulation (see Chart 1.2). Regulation aimed at controlling market behavior traditionally emphasizes increased transparency by financial institutions with regard to their customers and the market in general. Its purpose is to increase the quantity and quality of information available to consumers of financial products. Consequently, this type of measure underscores the degree to which the information provided to the market must be accurate, complete, timely, and relevant, with respect to both the products themselves (to support a more informed choice) and the financial position of the institutions and conglomerates they are part of (degree of disclosure). Overall, the idea is to make this information accessible not only for supervisory use, but also for other market participants (rating agencies, intermediaries, auditors, financial analysts, and the general public).

In addition, from a prudential regulation instrument perspective, greater disclosure of information to the market seeks, on the one hand, to reduce the problem of information asymmetry by influencing the market discipline mechanism (as part of the third pillar in Solvency II-type models). On the other hand, it is an important element in reducing the contagion effect among financial institutions that get into trouble; i.e. the risk that the financial difficulties of one member of a conglomerate may have adverse effects on the stability of the group as a whole or on the market (in the form of a negative externality), either of a psychological nature (due to the loss of confidence in other members of the conglomerate), or due to intra-group spread (because of loans between members of the conglomerate, cross-shareholdings, capital pyramiding, purchase and sale of securities, or guarantees granted among members of the group).

Market power

The second market failure is the problem of *market power*. To address this issue, public policy instruments are typically market behavior regulations and, more notably, economic competition policies, which result in the implementation of so-called antitrust laws.

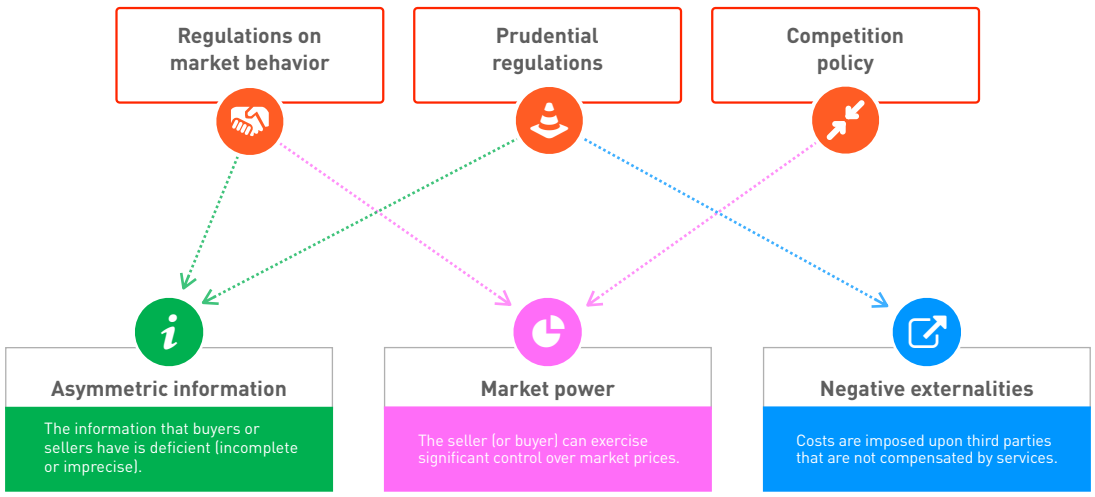
First, providing transparency to the market itself is a powerful weapon to limit the existence and spread of practices that limit competition, by making information available to consumers on the various options the market offers. However, in mitigating the problem of market power, enhanced disclosure is often accompanied by the enforcement of so-called antitrust laws. This set of provisions (which go beyond the framework of the financial system and usually apply to all economic activity) generally aims to prevent anti-competitive behavior among the different economic agents, punishing behaviors such as price collusion, market share agreements, and exclusive agreements, among others.

Negative externalities

Finally, the problem of *negative externalities* is the market failure that determines the majority of public policy measures in the financial markets. The fundamental instrument to address the problem of negative externalities is prudential regulation. Due to the nature and potential impact, prudential regulation of this market failure focuses on establishing measures to preserve the financial institutions' solvency positions, in order to limit the likelihood they will face bankruptcy or exits from the market, which may trigger the negative effects of that failure on consumers, and more broadly, on general economic performance.

To that end, prudential regulations establish a series of quantitative requirements for financial institutions (reserves and capital), associated, under different technical parameters, with the risk levels assumed by those institutions. Additionally, prudential regulation emphasizes two other qualitative items aimed at reducing the likelihood that an institution may face financial position and

Chart 1.2
Market failures and government intervention through regulation



Source: MAPFRE Economics

solvency problems. The first has to do with strengthening the governance of institutions, under the principle that as the standards of self-governance that regulate institutions' internal operations become more solid and better applied, the likelihood of failure will be reduced. Corporate governance standards, therefore, range from the responsibilities of boards of directors, and the integrity and competence of institutions' direct managers, to the identification of key roles (risk management, control and audit) to be performed by the institution, as well as general parameters for carrying them out. The second has to do with increasing disclosure of information to the market, as a way to stimulate the operation of the market discipline mechanism, which is ultimately another factor that encourages the proper management of institutions.

It should be noted that prudential regulation takes on particular features when its objectives must be developed by looking not only at financial institutions considered in isolation, but also at the conglomerates (financial or hybrid) to which they are connected, if any. In these cases, issues associated with the duties of management bodies, integrity and competency tests for managers, prevention of regulatory arbitrage, potential conflicts of interest, transfer of bankruptcy risk, possible mixing of investment portfolios, intra-group transactions outside market parameters, tied (conditional or packaged) sales, and even the enhancement of systemic risk, usually involve the adoption of additional regulatory standards.

1.3 Evolution of insurance-related prudential regulations

Standardization and harmonization of insurance regulation

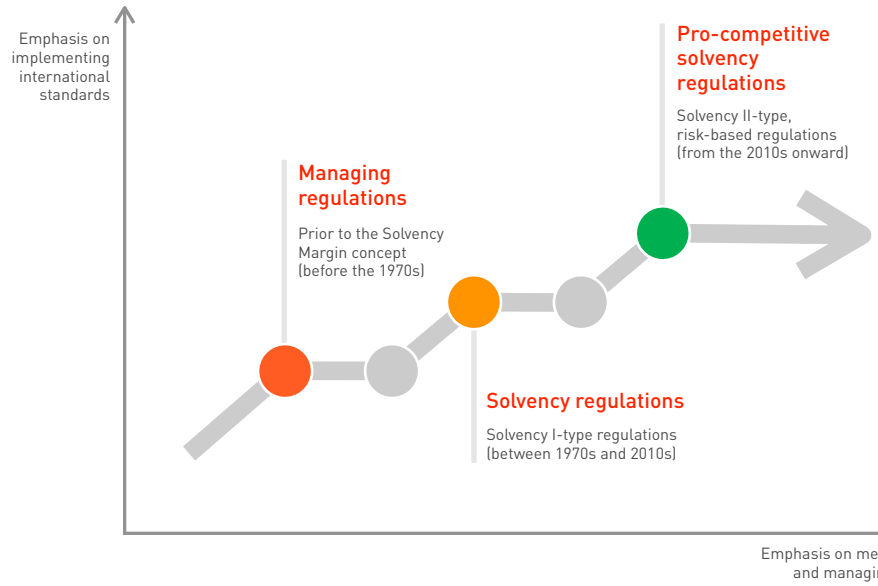
In the case of insurance activity, the evolution of prudential regulation has tended to converge in recent decades on conceptual elements common to the rest of the financial system. Although the regulation of the insurance industry was traditionally a task confined to domestic markets, the reality of global markets soon made it advisable to move towards increasing levels of regulatory consistency.

Thus, there have been three major dimensions to the global initiative toward regulatory standardization in the insurance field. The first arises from the efforts of the International Association of Insurance Supervisors (IAIS), the organization that initiated the drafting of regulation and supervision principles and standards, which have gradually been implemented by member countries. The second dimension (at the regional and principal markets level) was the determination to modernize existing solvency regulation systems. This framework gave rise to the European Solvency II plan, Solvency Modernization Initiative (SMI) by the National Association of Insurance Commissioners (NAIC) in the United States, and the development of the Swiss Solvency Test by the Swiss financial authorities, among others. And the third, following the financial crisis unleashed in 2008 with the collapse of Lehman Brothers in the United States and subsequent sovereign debt crisis in the European Union, was the definition of macro-prudential surveillance measures in order to limit potential systemic effects derived from insurance activity, thereby helping to maintain global financial stability.

This is the context for the IAIS[2] plan to establish an international capital standard (ICS), a risk-based capital sufficiency model that will initially apply to Internationally Active Insurance Groups (IAIG) and Global Systemically Important Insurers (G-SIIs). It could later be expected to apply to individual companies through various national regulations, becoming a true global capital standard (Prescribed Capital Requirement, PCR). This harmonized supervision framework is expected to be implemented in two phases. The first, monitoring, will take place over five years (2020–2024), followed by an implementation phase beginning in 2025.

As a result of this process, over the last few decades, insurance regulation has transitioned away from purely directive regulation based on general technical determinations and essentially addressing local considerations (prior to the creation of

Chart 1.3-a
General trends of prudential insurance regulations



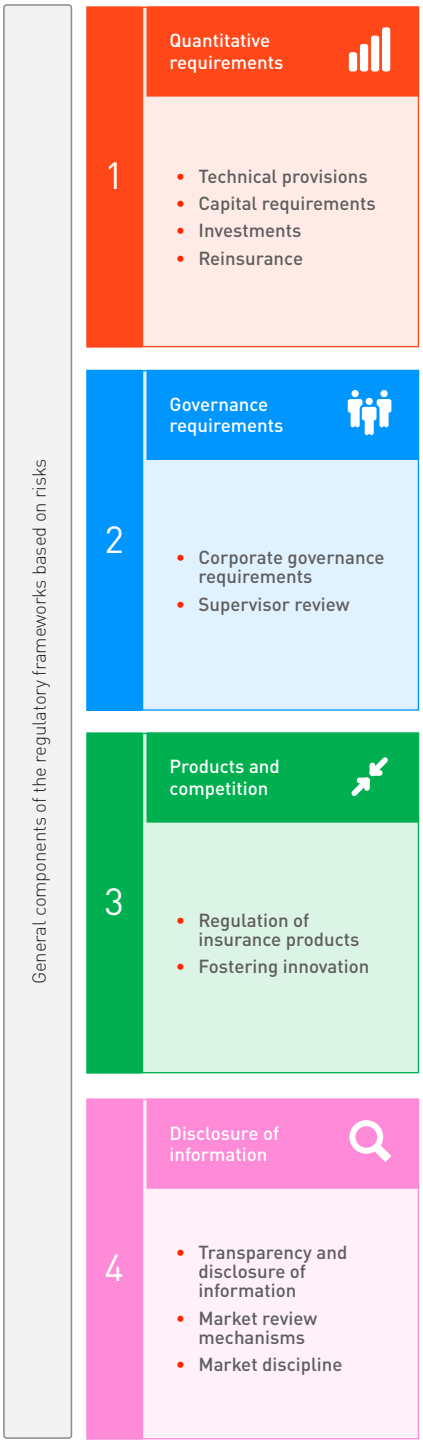
Source: MAPFRE Economics

the first solvency margin models in Europe), moving initially toward solvency regulation based on both the solvency margin of the European Economic Community (Solvency I) and the U.S. risk-based capital (RBC) system (between 1970 and 2010). Subsequently, it moved toward more pro-competition solvency regulation sustained by models (like Solvency II) in which, on the one hand, capital risk weights are more closely associated with the specific risk levels of each insurance company, and on the other, quantitative capital requirements and technical provisions are supplemented with more solid governance and disclosure of information to the market. For the purposes of this study, this type of regulation will be called "risk-based regulation" (see Chart 1.3-a).

The first step towards the harmonization of solvency requirements was taken in the European Economic Community insurance market in the 1970s, with the adoption of Directives for the creation of the solvency margin system (later renamed Solvency I) for Non-Life (1973) and Life insurance (1979). The same occurred in the United States, another of the world's large insurance markets, with the creation of the Risk-Based Capital (RBC) system in the early 1990s. The NAIC, which is the figure that coordinates the system of state regulators in the United States, developed that method to measure the minimum capital risk weight required for insurance companies, in order to sustain their operations, based on their size and risk profile.

Both models progressed towards the harmonization of prudential regulation in their respective geographic areas, thus becoming a reference for regulatory developments in other insurance markets around the world. It is important to point out, however, that Solvency I and RBC models in other markets (especially in emerging markets) were not always adopted by applying the methodologies on which they were based, but often by directly taking the

Chart 1.3-b
General components of the regulatory frameworks based on insurance risks



Source: MAPFRE Economics

risk factors resulting from the original designs. This resulted in the application of standards that under certain market conditions could have led to an underestimation or overestimation of capital requirements for those markets.

Currently, most insurance markets are immersed in ongoing regulatory adjustment processes that are still guided by the three dimensions mentioned above: the process of regulatory standardization and supervisory practices; the modernization of solvency systems toward risk-based models; and progress toward the establishment of a global solvency system (similar to that used in the banking sector) that will contribute to maintaining global financial stability. However, the various markets are moving toward solvency frameworks at the global level that attempt to cover, in general terms, four fundamental elements. First, a set of quantitative requirements in terms of capital, technical provisions, investments, and reinsurance that guarantee insurance companies' financial position. Second, a series of corporate governance standards that promote more professional (risk-based) management of companies, with the belief that this is a contributing factor in limiting the probability that a company will become insolvent. Third, prudential regulatory standards that could impact competition and innovation, and therefore the market's efficiency, such as those regulating products that could be brought to market and their conditions (structure and price). And finally, a series of transparency and information disclosure standards, which seek to improve how the market discipline mechanism works, as an additional element to stimulate companies' management to reduce the likelihood of insolvency (see Chart 1.3-b).

This report, as an update of our original report on this topic, aims to delve deeper into these aspects, based on an analysis of the characteristic regulatory frameworks in various regions of the world. Therefore, the analysis presented in the following sections examines the cases of the United States, Latin America, Asia-Pacific, United Kingdom, and European Union, as well as pertinent global initiatives headed by the IAIS.

2. Focus of the analysis

2.1 Features of the analysis

For the update provided in this report, we examined the prudential regulations applicable to insurance companies and their groups in a set of countries in various regions of the world, as well as their amendments since the last assessment conducted by MAPFRE Economics in 2017,[3] in order to incorporate the progress made since then toward risk-based regulation. Following the methodology used in the previous study, the analysis considers a total of twenty-three relevant factors that characterize the different solvency regulation systems, which are presented, to a greater or lesser extent, based on how much these systems have evolved towards pure risk-based systems. The list of items considered has not changed, and is presented on Table 2.1.

As this information reveals, the regulatory elements identified have been classified in three groups. The first (Group A) contains elements that are typically closer to a prudential regulation, less sensitive to the particular risk profile of each insurance company (Solvency I-type). The second group (Group B) considers regulatory elements that introduce greater complexity and approach risk-based capital models, representing a movement toward that type of prudential regulation model (transition elements). And, finally, the third group (Group C) includes regulatory elements of greater technical complexity, such as internal risk modeling, the interdependence between risks, and stress tests, which require a computational weight and higher degree of specialization inherent to a more sophisticated risk-based capital solvency system.

In general terms, the simplest systems (like Solvency I) are characterized by having the underwriting risk as the determining factor of the solvency capital requirement, with a system based on one or more factors applied to magnitudes considered representative of the level of exposure to insurance risk, such as premiums, loss ratios in Non-Life insurance, or mathematical provisions in Life insurance. This requirement is accompanied by a series of additional governance and investment standards to limit market and credit risks by introducing specific regulatory limits on diversification and dispersion, as well as a closed-list classification of assets eligible to cover the obligations arising from insurance contracts. These systems are further characterized by the introduction of prudential elements in the valuation of assets and liabilities, as well as strict standards regarding authorization to launch new products on the market.

Meanwhile, systems further developed towards a purely risk-based prudential regulatory system (such as Solvency II) are characterized by a greater number of risk factors considered, and they introduce more complex scenario simulation techniques for calculating the specific capital risk weights for underwriting, market, and credit risk, consideration of risk interdependence, and the use of internal models or calculation of regulatory solvency capital requirements at the group level, among others. These systems usually include explicit risk assessment measures, with a predefined time horizon and confidence level, such as value at risk (VaR or tail VaR), which would apply both in the calculation of capital under standard formulas, when the applicable factors or scenarios are calibrated under this explicit measure, or by applying internal models.

Table 2.1
Elements considered to assess local regulations

Group		Elements of regulatory assessment
A	1	Limits on investments: list of suitable assets
	2	Limits on investments: percentages of diversification
	3	Life and Non-Life underwriting risks, not disaggregated
	4	Prudential interest rate in mathematical provisions
	5	Prior authorization/registration of policies or technical basis
B	6	Market valuation of assets
	7	Valuation of technical provisions: better estimation and risk margin
	8	Reinsurance regulations - counterparty risk
	9	Underwriting risks by homogeneous groups
	10	Financial risks
	11	Mismatching risks
	12	Operational risks
	13	Transparency to market - risk profile
	14	Governance requirements: key functions/risks
	15	Risk analysis of specific operations at the group level (without capital requirement)
C	16	Explicit risk measures and relationships between risks
	17	Internal risk modeling
	18	Stress tests - Dynamic solvency - ORSA
	19	Market valuations (without exceptions) of assets
	20	Discount of provisions with risk-free rates (unadjusted)
	21	Governance requirements: full integration of risk function
	22	Transparency to market - complete breakdown of risk components
	23	Regulatory capital at the group level based on risks (with group capital requirement)

Source: MAPFRE Economics

With regard to eligible own funds to cover capital requirements, the most modern systems follow a comprehensive approach to economic valuation of surplus considering the "total balance sheet approach," in which assets and liabilities (and, alternatively, the surplus) are valued in a "market consistent" manner. In the case of obligations arising from insurance contracts, this requires a calculation based on a best estimate and a risk margin that aligns their valuation with an unforced transfer price between independent parties. It also opens the possibility for insurance companies to issue hybrid financing instruments that can be used (subject to certain limits) to strengthen their solvency position, and are considered according to the degree of loss absorption they allow in situations of non-compliance with regulatory capital requirements and/or in cases of insolvency (quality of the capital instruments or "tiering"). It should be noted that these systems do not consider prudential margins in the valuation of assets and liabilities, to the extent that such margins are taken into consideration exclusively for the purpose of calculating regulatory capital, with the determined metric (VaR, tail Var) and not when calculating eligible own funds.

Finally, these more modern systems are characterized by imposing neither limits on the list of assets in which insurance companies may invest beyond a general "prudent person" principle (the only limit usually refers to the use of derivatives on a speculative basis), nor regulatory requirements for investment dispersion. These aspects must be controlled within the framework of their own investment policies, taking into account that investments incorporating a higher risk component will require higher capital risk weight and, in a broader sense, are part of the company's risk management process.

Meanwhile, these regulatory systems extend risk analysis not only to the estimation of quantitative requirements (Pillar 1 in Solvency II-type models), but also to governance-related functions (specifically those related to risk management) and transparency to the market (Pillars 2 and 3). In this regard, they provide for specific duties to be performed by the companies' boards of directors, emphasizing the need to develop a comprehensive risk management function. Moreover, these solvency systems do not usually establish prerequisites for the launch of new insurance products on the market, notwithstanding their possible subsequent control by the supervisory authorities. As with investments, products that incorporate higher risk elements, retained by insurance companies, will involve higher capital risk weights.

Finally, the most modern risk-based regulatory systems establish transparency standards, towards both regulators and the market, which provide for the obligation to disclose the company's and its group's risk profile with a high level of detail. They also consider advanced risk control elements that must reach all levels of the organization, including projections and analysis of prospective scenarios based on the business plans approved by the boards of directors and shareholders' meetings. The foregoing is a precondition to stimulate the most efficient operation of the market discipline mechanism.

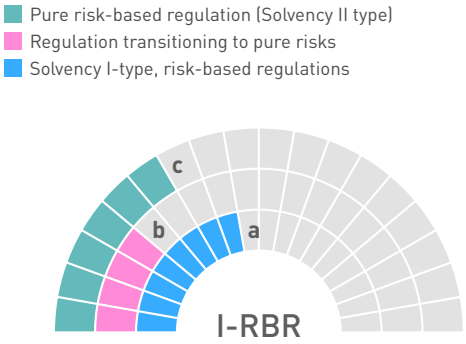
It should be noted, however, that between these two extremes there are regulatory systems that, while based on Solvency I-type standards, have incorporated transitional measures moving toward a system based essentially on risk assessment and measurement, more rigorous governance, and higher levels of information disclosure to the market. This particular regulatory system transition has also been considered within the elements of analysis presented in the next section of this report.

2.2 Risk-Based Regulation Proximity Index

In the update presented in this report, criteria have been maintained for the construction of the Risk-Based Regulation Proximity Index (I-RBR) proposed in our 2018 report. This ensures a uniform metric that allows us to compare how far the regulatory frameworks analyzed have progressed toward risk-based systems. Thus, the I-RBR seeks to identify the degree of progress of the various regulatory frameworks in terms of their transition from basic risk-based regulation (Solvency I-type) to regulation focused on more precise risk management and measurement, strengthening corporate governance, and greater transparency and disclosure of information to the market (Solvency II-type).

It is important to note that the I-RBR is in no way intended to classify the efficiency or quality of the regulation in the different markets analyzed or the effectiveness of the supervision that takes place there. Rather, it exclusively measures the transition process of regulatory frameworks toward risk-based regulations, both to establish capital risk weights and to consolidate their improved management, based on the terms set forth in the respective regulations. Thus, in preparing the I-RBR, a series of elements

Chart 2.2
Risk-Based Regulation Proximity Index (I-RBR): construction method



$$I\text{-}RBR = a(w_a) + b(w_b) + c(w_c)$$

where:

a: evaluation of elements from Group A
w_a: weighting of the elements from Group A
b: evaluation of elements from Group B
w_b: weighting of the elements from Group B
c: evaluation of elements from Group C
w_c: weighting of the elements from Group C

Source: MAPFRE Economics

were defined that characterize a prudential regulation system, which were specifically valued for each of the markets examined, classifying them into three groups (see the cited Table 2.1).

When analyzing the prudential regulation framework in each market, these elements were evaluated on a scale of 0 to 10, based on their features and the degree of implementation in their respective legislation. Thus, for the purposes of constructing the index, a specific weighting was assigned to the joint evaluation of each group of elements. First, Solvency I-type systems were considered to incorporate basic elements of prudential regulation that, to some extent, seek to limit different sources of risk, so Group A elements were assigned a weight of 0.3. Meanwhile, the evaluation of the transition elements towards Solvency II-type risk-based regulations (Group B elements) was assigned a weight of 0.6. And finally, the weight of factors considered determining elements of the proximity to a Solvency II-type or pure risk-based capital system (Group C elements) have a weight of 1. That is:

$$I\text{-}RBR = a(w_a) + b(w_b) + c(w_c)$$

Where:

a: evaluation of Group A elements
b: evaluation of Group B elements
c: evaluation of Group C elements
w_a: weight of Group A elements
w_b: weight of Group B elements
w_c: weight of Group C elements

Based on the above, the I-RBR is constructed as the weighted sum of the valuation of this set of elements, and adopts a value of 10 when a regulatory system is perfectly aligned with the measurement of pure risk (see Chart 2.2).

3. Analysis by region

Considering the conceptual framework posed in the previous section of this report, as well as the features of the analysis conducted through estimation of the Risk-Based Regulation Proximity Index (I-RBR), this section presents an updated analysis of the characteristic regulation frameworks in various regions of the world, with information as of February 1, 2024. These regions are: United States, Latin America, Asia-Pacific, European Union, United Kingdom, and finally, the system being created by the International Association of Insurance Supervisors (IAIS) to establish an international capital standard, in order to illustrate a comparison of their level of progression toward risk-based regulations.

3.1 United States

Regulatory framework

In the United States, since the early 1990s, the National Association of Insurance Commissioners (NAIC) has been developing a standard method for calculating the minimum capital deemed necessary to support the undertakings of insurance companies, based on their size and risk profile, known as Risk-Based Capital (RBC). This system is characterized by not being a harmonized system, as the regulatory power is decentralized at the level of the different U.S. states. However, the NAIC drafts and publishes the standard and supporting documents for supervision of the insurance companies by state supervisors, who have the authority to do so.

These documents take the form of "model acts" and instruction manuals, which are guidelines with standards covering all levels of the supervisory framework, both quantitative requirements and those relating to the governance system, supervisory procedures, and transparency of information to the market. Thus, the states in that country can incorporate the model acts drafted by the NAIC into their respective legislation. Numerous states have decided to introduce them into their legislation without substantial changes, but it is not unusual to see cases where they have been introduced with some changes. In turn, these model acts refer to the instructions the NAIC prepares in the form of manuals such that, once adopted by the states, these instructions become binding. The manuals are accessible and very detailed, which gives the system a high degree of predictability.

Currently, most states have decided to incorporate the RBC model into their respective legislation without substantial changes. However, in some isolated cases, they have been partially incorporated with some changes, or versions have been applied that are not fully aligned with the latest versions drafted by the NAIC. Nevertheless, the RBC model has been implemented with few changes in states with high premium volumes, such as California, Florida, Illinois, Pennsylvania, Ohio, North Carolina, Virginia, Colorado, and Maryland. Other states with high premium volumes have adopted it with unique features, introducing some elements that deviate, to some extent, from the original version of the system, such as Texas, New York, New Jersey, Michigan, Georgia, and Massachusetts. These changes usually do not refer to the NAIC instructions on RBC calculation, but instead to other aspects of the model act, so it may be said that the RBC calculation designed by the NAIC is practically universally applied in the U.S. insurance market.

Solvency ratio

For a comprehensive view of the quantitative requirements applicable to the regulation of this market, all the elements involved in the construction of the solvency ratio,[4] contained in the "Risk-based Capital (RBC) For Insurers Model Act"[5] and in the "Risk-Based Capital (RBC) for Health Organizations Model Act"[6] must be analyzed, both with regard to capital requirements (RBC) and to the determination of the capital available to the insurance company to cover these requirements (Total Adjusted Capital). The ratio resulting from the comparison of eligible own funds with regulatory capital requirements will determine the level of intervention, if any, the supervisor deems necessary to implement in order to overcome a possible distress situation or ultimately insolvency.

Liability valuation

The valuation of assets and liabilities is an essential element to be considered when determining eligible capital or own funds. In terms of liability valuation, most of the states in that country have assumed the so-called "Standard Valuation Law,"[7] which contains the accounting standard for the valuation of liabilities arising from insurance contracts in the United States, applied as of 2017 to the underwriting of new business. This system for valuing the technical provisions corresponding to insurance contracts introduces a new valuation method based on more modern principles, with forecasts of flows and stochastic calculations for Life insurance products with options, among others. The states of Alaska, Massachusetts, and New York (along with Puerto Rico) were the last to adopt them, so their application has been generalized for new contracts since their adoption. The uniqueness of the latter states, which, in our previous report, lagged behind in terms of the progression towards a risk-based prudential regulatory system,[8] is therefore eliminated. Liabilities are valued with the "Standard Nonforfeiture Law for Life Insurance"[9] and the "Standard Nonforfeiture Law for Individual Deferred Annuities."[10] These model acts, in turn, refer to the instructions contained in the NAIC valuation manual.[11]

Asset valuation

The valuation of assets is another essential element to be considered when determining eligible capital or own funds. The model acts of the NAIC that establish asset valuation criteria are called "Investments of Insurers Model Act (Defined Standards Version)"[12] and the "Investment of Insurers Model Act - Defined Limits Version."[13] These model acts refer to the book valuation insurance companies must perform in accordance with the accounting criteria and valuation standards published by the NAIC, including its accounting practices and procedures manual, the marketable securities valuation manual, and the instructions for annual financial statements, among others. In August 2023, the NAIC proposed a holistic review of the risk valuation framework for insurance companies' investments to improve the resilience of their balance sheets, taking into account tail risks, particularly in structured products with different tranches depending on credit risk (Credit Linked Obligations-CLO and other Asset Back Securities-ABS), the role played by rating agencies and concentration risk, among other items.[14]

Qualitative requirements

The qualitative requirements are based on the NAIC's "Risk Management and Own Risk and Solvency Assessment Model Act,"[15] which has been adopted by virtually all U.S. states. Moreover, with respect to the supervision of these items, the NAIC develops manuals to support supervisors, which are an important tool in assessing the availability of a sufficient infrastructure for the effective implementation and control of a risk-based prudential regulatory system. These manuals are publicly available, so they are well-known to both supervisors and insurance companies.

It should be noted that the regulatory model designed by the NAIC includes limits applicable to investments, as well as prerequisites for the launch of new products. All the states, without exception, apply regulatory limits to investments and prerequisites for the launch of new products, following the NAIC model or with their own adaptations.

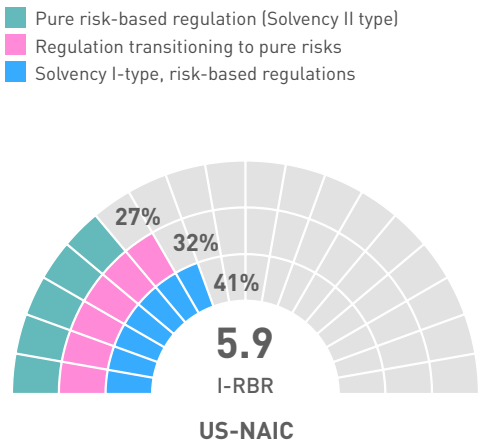
Limits applicable to investments

The model designed by the NAIC regarding the limits applicable to investments, basically contained in two model laws, the "Investment of Insurers Model Act - Defined Limits Version" and the "Investment of Insurers Model Act - Defined Standard Version," mentioned above, is also noteworthy for the purposes of this study. This system is supplemented by the "Investments in Medium and Lower Grade Obligations Model Regulation"[16] and the "Derivative Instruments Model Regulation."[17] A significant number of states have adopted these model acts with significant modifications in terms of percentages to be applied and the lists of eligible assets, but all of them apply limits, so they all receive the same consideration for the purpose of analyzing the degree of proximity to a pure risk-based regulation.

Requirements for launching new products on the market

Finally, the provisions related to requirements for launching new products are based on the "Interstate Insurance Product Regulation Compact"[18] for Life insurance, the "Property and Casualty Commercial Rate and Policy Form Model Law"[19] for Property and Casualty insurance, the "Health Policy Rate and Form Filing Model Act"[20] for Health insurance, as well as the NAIC's "Product Filing Review Handbook."[21] There are some significant changes in the states' adoption of these model acts, especially with regard to Property and Casualty and Health insurance, but they all contain prerequisites for the issuing of new products by the insurance companies. The standard for Life insurance has been adopted by most states in the country, with the exception of the District of Columbia, Florida, Indiana, and Vermont, and in the case of Property and Casualty and Health insurance, more states have introduced unique features, but not enough to receive differential treatment.

Chart 3.1
United States: Risk-Based Regulation Proximity Index (I-RBR)



Source: MAPFRE Economics

Estimation of the I-RBR

Chart 3.1 shows the estimation of the Risk-Based Regulation Proximity Index (I-RBR) applicable across the United States (USA-NAIC), eliminating the separate mention made in our 2018 reports of Alaska, Massachusetts, and New York, which was somewhat lower in the previous assessment, as at that time they had not yet adopted the latest version of the NAIC valuation standard applicable to technical provisions. This is no longer the case, as all of them have incorporated the aforementioned standard in their respective national legislation.

3.2 Latin America

In Latin America, generally speaking, progress continues in terms of the incorporation of qualitative requirements into insurance companies' risk management (Pillar 2 of the Solvency II-type models), although Solvency I-type regulation systems persist in terms of quantitative requirements (Pillar 1). In them, the determining factor of the capital requirement is defined by the underwriting risk, with a system based on one or more factors applied to magnitudes considered representative of the level of exposure to insurance risk, such as premiums, loss ratios (in Non-Life insurance), or mathematical provisions and/or capital at risk (in Life insurance).

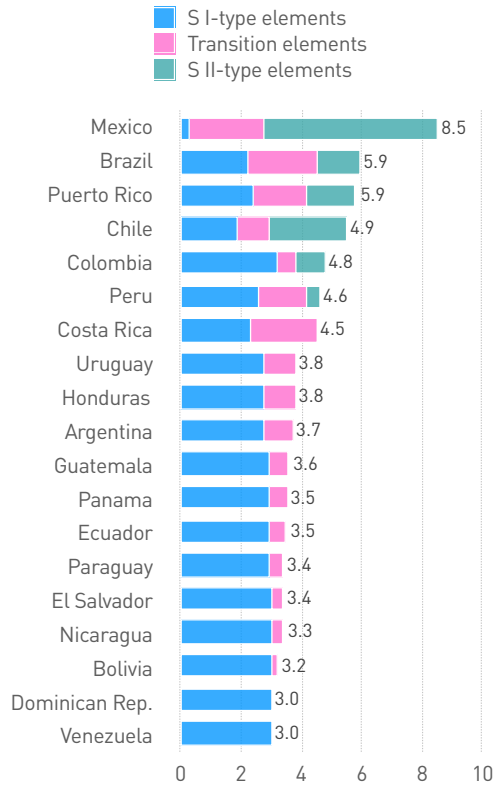
In order to control other risks, such as financial risks, some companies have introduced various additional governance and investment standards, specific regulatory limits on diversification and dispersion, and a closed-list classification of assets suitable to cover the obligations arising from insurance contracts. This framework is usually completed with the obligation to perform certain adequacy tests of the assets backing long-term insurance obligations, based on cash flow projections. This type of test is particularly important, given that the expansion of individual account-based pension systems in the Latin American region has led to a significant increase in insurance companies contracting annuity products in the decumulation phase for people reaching retirement age. Moreover, most regulations in the Latin American region are characterized by the introduction of prudential elements in the valuation of insurance assets and liabilities.

This reassessment of regulatory developments in Latin America confirms that there is a long way to go in the implementation of risk-based regulatory solvency capital calculation models, especially with regard to the quantitative requirements pillar. In a move in that direction, some regulations have introduced capital risk weights to incorporate requirements for financial risks, but without considering the effects of diversification among risks, which may result in an increase in capital requirements above the amount that would result from the full implementation of a pure risk-based system.

Notwithstanding the foregoing, the potential difficulties associated with insurance companies and supervisory authorities complying with exclusively risk-based prudential regulation should be taken into account when, due to the features of their markets, it is still difficult for them to have an adequate institutional and market infrastructure to fully implement these systems. However, in countries with relatively small markets, notable steps have been taken to implement governance requirements with a division of functions in which the risk function takes on a relevant role in the management of insurance companies, which should be evaluated positively.

Under the analysis criterion of the regulatory measures formally implemented as a basis to estimate the Risk-Based Regulation Proximity Index (I-RBR) applicable to the countries of this region, Latin American insurance markets can be classified into three groups (see Chart 3.2-a). The first group consists of two insurance markets (Dominican Republic and Venezuela) with regulatory systems that essentially maintain the features of the Solvency I-type systems, and implemented measures that suggest a transition toward risk-based systems have not yet been identified. Since the previous assessment (with information as of 2017), Argentina, which was part of this first group, has moved into the second group due to its progress in the regulation of the second pillar. This group is now made up of ten markets (Argentina, Costa Rica, Uruguay, Ecuador, Guatemala, Paraguay, El Salvador, Panama, Nicaragua, Bolivia, and Honduras). While these markets maintain Solvency I-type regulations, they have gradually progressed, with varying

Chart 3.2-a
Latin America: Risk-Based Regulation Proximity Index (I-RBR) summary



Source: MAPFRE Economics

depth levels, in the implementation of transitional measures towards risk-based regulation.

Finally, a third group of countries consists of six markets (Mexico, Brazil, Puerto Rico, Colombia, Chile, and Peru) that, in addition to varying degrees of progress in transitional measures towards risk-based regulation, have already implemented (also with varying degrees of depth) measures that are fully consistent with risk-based regulation (Solvency II-type). In particular, in 2015, Mexico and Brazil obtained provisional equivalence to the Solvency II system from the European Commission for a ten-year period; this equivalence must be renewed, if applicable, in 2025.[22] The estimation and composition of the individual I-RBR for each of the Latin American markets is presented in Chart 3.2.-b.

It is important to note that, although in the Latin American region there are still a large number of markets at an early stage of implementing risk-based regulatory systems, the picture is different in terms of premium volume. Thus, with figures at the end of 2022, markets that maintain Solvency I type regulation (Group 1) accounted for only 1.5% of total insurance premiums in the region. Meanwhile, markets with a Solvency I-type system that have implemented transitional regulatory measures (Group 2) accounted for 16.7% of regional premiums that year. And finally, the markets that have made most progress in the aforementioned regulatory transition process (Group 3) accounted for 81.8% of insurance premiums in Latin America in 2022.

3.3 Asia-Pacific

In the Asia-Pacific region, with the exception of the Philippines, which introduced mandatory implementation of an ORSA in 2022 for large companies, there has not been significant regulatory progress with respect to the last assessment completed with information from 2017.[23] Accordingly, Australia and Japan, two mature and developed insurance markets, show the greatest degree of progress in their regulations (see Chart 3.3-a).

Japan has made significant progress in relation to how insurance companies and financial institutions treat risks, with the goal of introducing a solvency system based on Solvency II-type economic value in 2025. Because of this progress, this country obtained temporary Solvency II equivalence for five years for reinsurance activity, which expired in 2020 without a new declaration of equivalence from the European Commission. Instead, the European Insurance and Occupational Pensions Authority (EIOPA) and Financial Services Agency of Japan have signed an enhanced cooperation agreement pending the implementation of the new solvency regulation system.[24]

Chart 3.2-b
Latin America: Risk-Based Regulation Proximity Index (I-RBR)

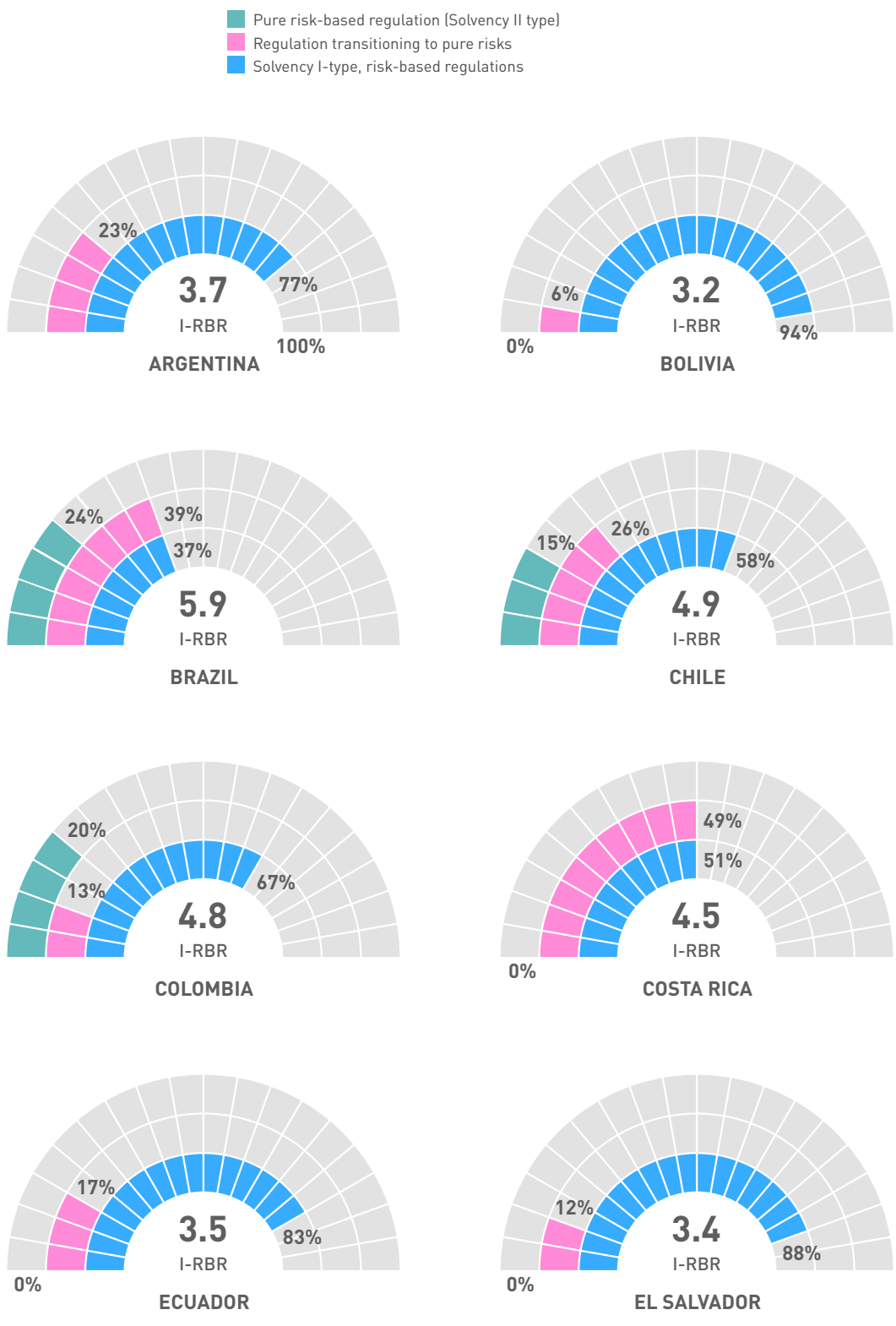


Chart 3.2-b (continued)
Latin America: Risk-Based Regulation Proximity Index (I-RBR)

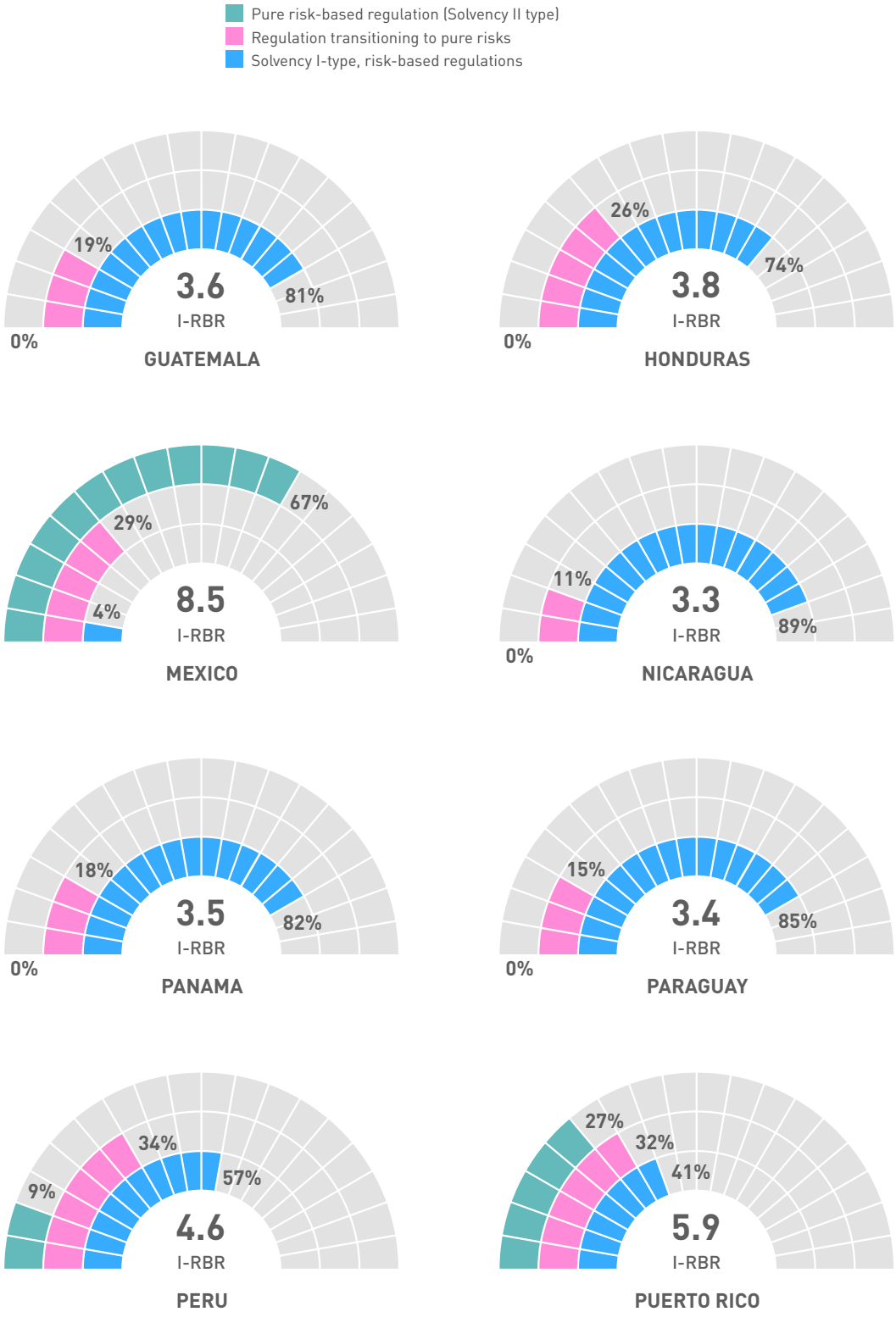
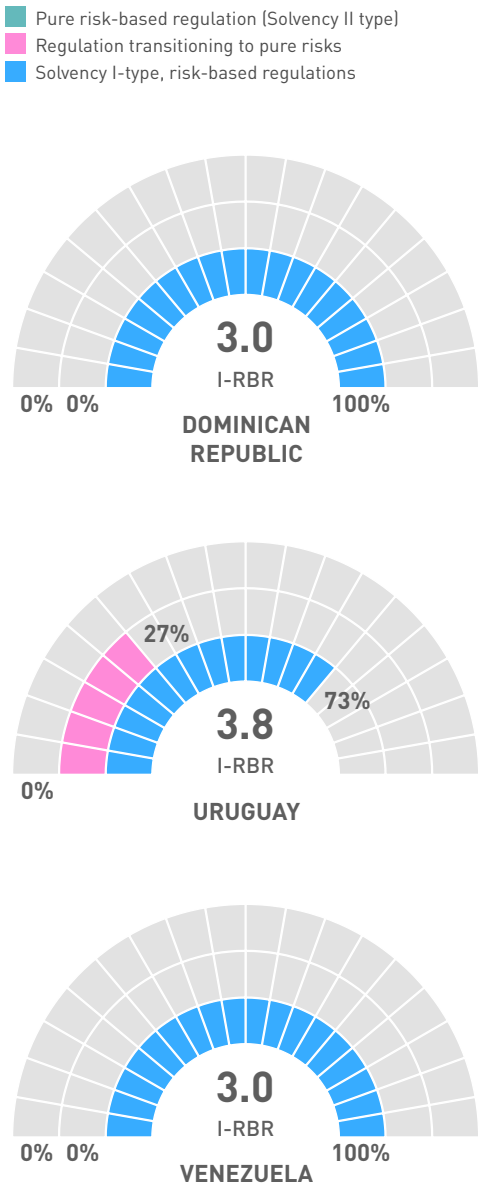


Chart 3.2-b (continued)
Latin America: Risk-Based Regulation Proximity Index (I-RBR)

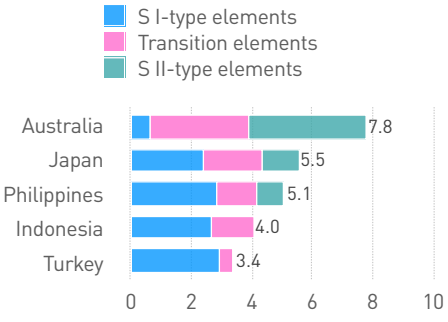


Source: MAPFRE Economics

Currently, the regulatory and supervisory authorities in Japan are finalizing the process to develop the aspects to be incorporated, especially in the area of mark-to-market valuations of liabilities arising from insurance contracts and, ultimately, the calculation of available capital following a comprehensive approach of calculating surplus based on the balance sheet total and market-consistent valuations. Field tests are being conducted to assess the impact of their introduction, with particular attention to the effects of the prolonged low interest rate environment and current situation in fixed income financial markets following the global spike in inflation as a result of supply chain disruptions and the economic measures adopted during the pandemic.

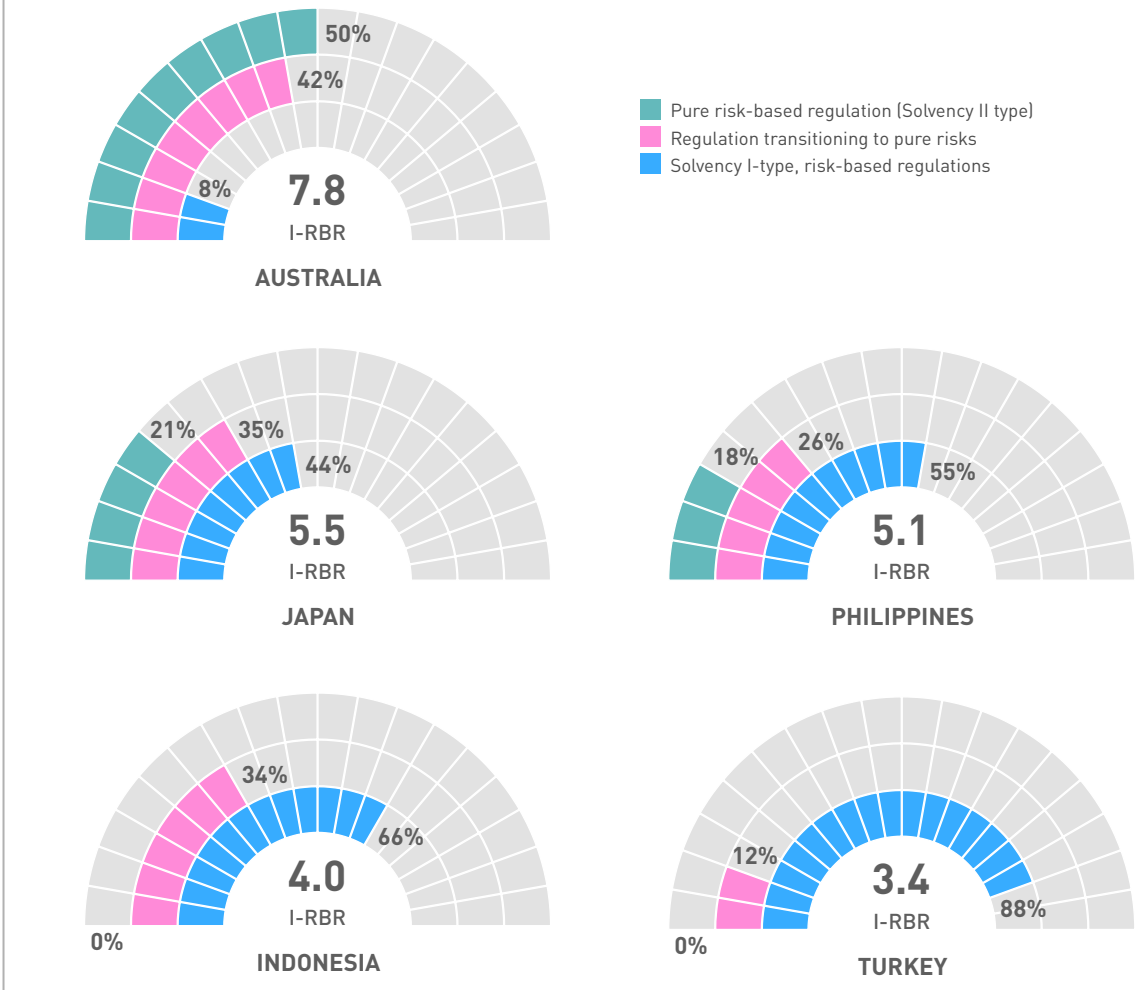
Australia, meanwhile, has a superior assessment in terms of its proximity to a risk-based regulatory system, and was granted provisional Solvency II equivalence by the European Commission in 2015, for a period of ten years.[25] The sample of markets analyzed in this region is supplemented by three emerging markets: Philippines, Indonesia, and Turkey. The Philippines follows a system close to the U.S. RBC, while Indonesia[26] has incorporated significant advances in terms of the treatment of financial risks and derivatives of insurance obligations; it nevertheless maintains limits regarding the assets in which insurers can invest, as well as a strict system for the authorization of new products. Finally, Turkey is still the system among the sample analyzed that continues to show the greatest proximity to Solvency I-type systems, although it also presents some progress in the treatment of financial risks.

Chart 3.3-a
Asia-Pacific: Risk-Based Regulation Proximity Index (I-RBR) summary



Source: MAPFRE Economics

Chart 3.3-b
Asia-Pacific: Risk-Based Regulation Proximity Index (I-RBR)



Source: MAPFRE Economics

As stated in the case of the Latin American markets, the possible difficulties associated with insurance companies and supervisory authorities complying with purely risk-based prudential regulation should be considered when, due to the features of their markets, it is still unlikely for them to have an adequate institutional and market infrastructure to fully implement these systems. Although some of the markets analyzed in this region are relatively small at present, they have great potential for growth, so the steps taken to bring these systems closer to risk-based regulation, albeit gradually, should be viewed positively. Finally, Chart 3.3-b illustrates the level and composition of the individual I-RBR for each of the markets analyzed in this region, in which the progress in regulatory adjustment in Australia and, to a lesser extent, Japan clearly stands out.

3.4 European Union and United Kingdom

In 2016, the European Union took a definitive step when Solvency II came into force; at the time, it was one of the most advanced regulatory systems for risk-based solvency capital, along with the Swiss Solvency Test and, after Brexit, Solvency UK, which seek to

adapt capital requirements to the risk profile of each insurance company and its groups. Thus, the implementation of these regulatory systems seeks a more efficient allocation of capital by the companies participating in the markets within levels of confidence that are considered adequate to protect policyholders.

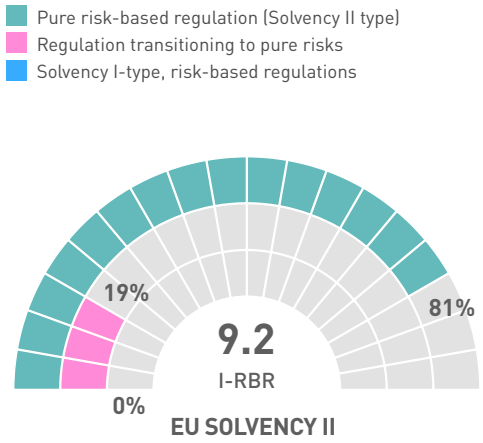
Eight years after its implementation, on December 14, 2023, the European Parliament and the Council reached an agreement on the European Commission's proposal to amend the Solvency II regulatory framework. The purpose of this proposal is to adjust the aspects deemed necessary, and in particular, to give the insurance industry better incentives to make long-term investments, in line with the Capital Markets Union initiative, making the financial strength of insurance companies less sensitive to short-term market fluctuations and improving the calculation of certain risks, including those related to climate change.[27]

This regulatory system applicable in the European Union is characterized by introducing maximum harmonization, with detailed regulation of the system's main aspects, through the Solvency II Directive, which the Member States have had to transpose into their respective domestic systems. It also features Community development rules for the quantitative requirements and other aspects through regulations and implementing technical standards, which directly apply in the States that do not require transposition.[28] The European Insurance and Occupational Pensions Authority (EIOPA) also participates in the supervision of internationally active groups and prepares guidelines for the application of certain aspects of the system, with additional oversight functions related to financial stability, among others.

The solvency prudential supervision framework in force in the European Union (Solvency II) is based on three pillars. The first pillar is related to quantitative requirements that establish the standards to calculate the solvency ratio, by dividing eligible own funds by the risk-based solvency capital requirement (SCR). A comprehensive approach of total balance sheet surplus valuation and market-consistent valuations ("total balance sheet approach"), sensitive to the quality of the equity under consideration ("tiering"), is followed when calculating eligible own funds. The risk-based solvency capital requirement (SCR) is calculated modularly, calibrated according to a one-year value at risk methodology with a 99.5% level of confidence. It should be noted that this system is characterized by the mandatory calculation of capital requirements at both the individual and group level. Likewise, capital risk weights are adapted to the risk profile of insurance companies, reinsurance companies and their groups, considering diversification profits and allowing the use of total or partial internal models, subject to prior authorization by supervisors. A ratio of less than one would result in the supervisor taking precautionary measures. Likewise, there is a second intervention level of another magnitude, called the minimum capital requirement (MCR), which is calculated quarterly, and when not fulfilled results in the adoption of more urgent and severe measures by supervisors. In addition to this quantitative pillar, there is a second pillar related to governance requirements, including the risk function and the supervisory process, as well as a third pillar related to transparency to regulators and the market, as an element to stimulate the operation of the market discipline mechanism.

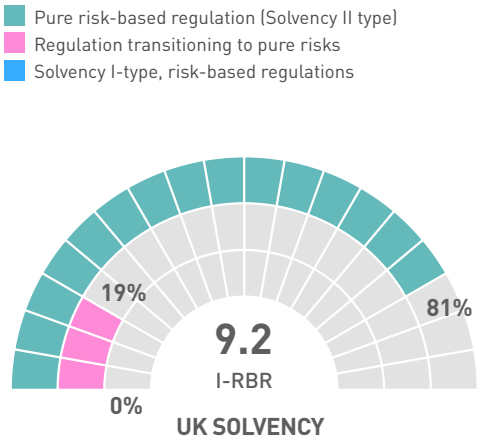
Under the prevailing Solvency II system in the European Union, there are no categories or quantitative limits on investments, except the prohibition of the use of speculative derivatives. In addition, the principle of prudence applies to investments, which receive higher capital risk weights the higher the risk. Finally, no prior authorization or notification is required to launch new products, notwithstanding possible subsequent control by supervisors, under the principle that risk management activities within a company's governance are

Chart 3.4-a
European Union: Risk-Based Regulation Proximity Index (I-RBR)



Source: MAPFRE Economics

Chart 3.4-b
United Kingdom: Risk-Based Regulation Proximity Index (I-RBR)



Source: MAPFRE Economics

supplementary to the traditional product review or approval mechanisms.

Based on the preceding elements, the result of the I-RBR estimate for the European Union and its structure is shown in Chart 3.4-a. The comparison of this index with the estimated index for the rest of the regions analyzed shows that Solvency II is currently the most advanced risk-based regulatory model at the international level.

Finally, it should be noted that following the United Kingdom's exit from the European Union, the country is in the process of reviewing the Solvency II system applicable to the UK. The Prudential Regulation Authority (PRA) is currently conducting the corresponding Quantitative Impact Studies (QIS) in order to gather the information necessary to determine which reforms would be the most appropriate to meet the goals set by the country's government. However, for the time being the applicable system (which we have called Solvency UK) is similar to Solvency II, so it would receive the same rating as the European Union in the I-RBR (see Chart 3.4-b).

4. Global regulation: the Insurance Capital Standard (ICS-IAIS)

The International Association of Insurance Supervisors (IAIS) is the international body with the mandate of establishing regulation and supervision standards related to insurance activity and contributing to financial stability. In this sense, the IAIS has been working on drafting harmonized frameworks for solvency supervision, for both Global Systemically Important Insurers (GSIIs) and non-systemic Internationally Active Insurance Groups (IAIGs).

In November 2019, the IAIS approved the reformed harmonized framework for cross-border supervision of the solvency of Internationally Active Insurance Groups (IAIGs), which includes the standard capital calculation for these insurance groups (Insurance Capital Standard, ICS, Version 2.0).[29] Known as the Common Framework (ComFrame), it is intended to serve as a guide and to provide the supervisory authorities a common language for the supervision process of the various countries in which IAIGs operate. In addition to the ICS, the ComFrame contains a series of Insurance Core Principles (ICPs) applicable to the supervision of IAIGs.

It should be noted that this standard applies to IAIGs that meet minimum international activity volume requirements, based on three criteria: (i) they have at least 50 billion dollars in assets or 10 billion dollars in premiums, (ii) they operate in at least three jurisdictions, and (iii) at least 10% of premiums are underwritten outside the original jurisdiction. This common supervisory framework is expected to be implemented in two phases: an initial monitoring phase lasting five years, over the 2020–2024 period, followed by a second implementation phase starting in January 2025 (see Chart 4-a).

In the monitoring phase, the minimum solvency capital calculation for IAIGs will be used for discussion by supervisory colleges on a confidential basis and will not lead to supervisory action based on the results of the standard being applied. The information provided by supervisors during this process will help to drive additional improvements prior to the implementation

Chart 4-a
Time schedule of the ICS of the IAIS

Source: MAPFRE Economics (with data from IAIS)

of the standard as a Prescribed Capital Requirement (PCR).

In addition, as part of the regulatory and supervisory measures aimed at safeguarding global financial stability, the IAIS adopted the so-called "Holistic Framework" for systemic risk assessment and mitigation, implemented since early 2020. This framework consists of a series of reinforced supervisory policy measures and powers of intervention, an annual monitoring exercise run by IAIS, as well as a collective discussion of the results of the exercise, appropriate responses and their implementation.

At the same time, the IAIS is evaluating whether the Aggregation Method (AM) developed by the United States offers results comparable to those of the ICS. If so, a determination will be made as to whether an equivalent results approach will be considered for the application of the ICS as a Prescribed Capital Requirement (PCR), taking into account the comparability criteria approved in March 2023[30] and the data submitted by the participating insurance groups, which includes the results and scenario analyses of the proposed ICS as a PCR and the interim AM, which will be used to assess whether the comparability criteria are met. The final decision by the IAIS on comparability is expected by the end of 2024.

In the current version of the ICS (Version 2.0), the second of the options proposed by the IAIS related to valuation of the risk margin of mathematical provisions disappears. Of the two options considered, the first (Risk Margin-1) sought to align the valuation of the insurance obligations with a transfer price, while the second (Risk Margin-2) entails introducing a prudential margin in the valuation of these obligations. This second option introduces a singularity that would move the model away from a pure risk-based regulation, in which no prudential margins are considered in valuations. The prudential margin in the design of a pure model is taken into consideration exclusively when calculating regulatory capital, with a given metric (1-year VaR and 99.5% confidence, in the case of the ICS), and not when calculating eligible own funds following a comprehensive economic valuation approach of the total balance sheet surplus ("total balance sheet approach"). In any case, in general terms, the ICS comes close to the most advanced regulatory systems internationally, which have been considered in this study.

ICS features

From a methodological perspective, the ICS system designed by the IAIS is similar to the model defined for the purposes of this study as a prudential regulation system based on risks and market valuations, although it contains some elements that move it away from a pure risk-based system, as is the case with other systems analyzed. The very principles on which the ICS is built justify these deviations, while seeking, first, to minimize the risk that the regulation may provoke pro-cyclical reactions in certain situations and, second, to strike an appropriate balance between risk sensitivity, the simplicity of the system, and a certain flexibility in terms of the possible particularities that may apply in some jurisdictions that do not represent a significant deviation from the global standard. Other elements that could give rise to differences, albeit minor, are the definition and limits on insurance contracts.

Meanwhile, the qualitative requirements related to adequate risk management and supervision procedures are also considered in the model designed by the IAIS, in accordance with the ICS principles (ICS Principle 6) and within the so-called ComFrame or common framework for the supervision of IAIGs. Finally, the ICS must also be transparent to supervisors and to the market, especially with regard to the transparency of the final results (ICS Principle 9), thus seeking to stimulate the operation of the market discipline

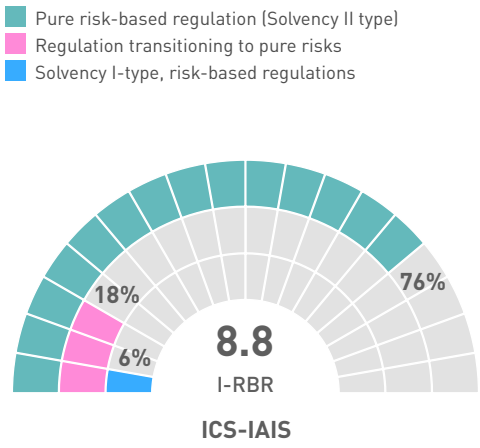
mechanism, in line with the structure of a risk-based regulatory system.

Estimation of the I-RBR

Of the various options that were considered at the time, the most relevant in terms of estimating the I-RBR in the case of the ICS was that related to the risk margin of mathematical provisions, seeking to align the valuation of insurance obligations with a transfer price, or to introduce a prudential margin in the valuation of these obligations.

The latest version of this capital standard being developed by the IAIS, the Candidate ICS, is based on ICS Version 2.0 and is pending the latest modifications, with the goal of being finalized by the end of 2024, to become the "Prescribed Capital Requirement" (PCR).[31] This standard still introduces some element of prudence in calculating the margin over the best estimate of technical provisions (MOCE), thus moving away from a capital cost-based methodology similar to that considered in Solvency II, so it is closer to the Risk Margin-2 option in the assessment made in the previous 2018 report (see Chart 4-b).

Chart 4-b
ICS-IAIS: Risk-Based Regulation Proximity Index (I-RBR)



Source: MAPFRE Economics

5. Regulatory progression: a global view

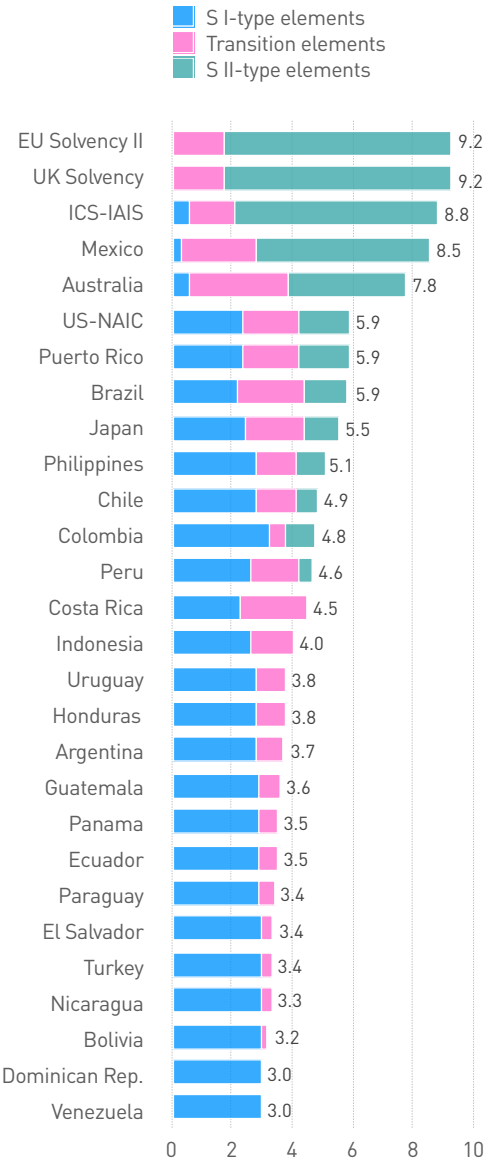
5.1 Current situation

As the analysis of different regions has shown, insurance markets around the world are still immersed in regulatory adjustment and implementation processes guided by three dimensions: (i) the process of standardizing regulatory and supervisory practices; (ii) the modernization of solvency systems toward risk-based models; and (iii) progress toward the establishment of a global solvency system that contributes to maintaining global financial stability. Charts 5.1-a and 5.1-b illustrate the updated value and composition as of January 2024 (with information from 2023) of the Risk-Based Regulation Proximity Index (I-RBR), estimated from the analysis performed on each regulatory model considered in this study and its development since the last assessment in our 2018 report.

5.2 Features of risk-based regulations

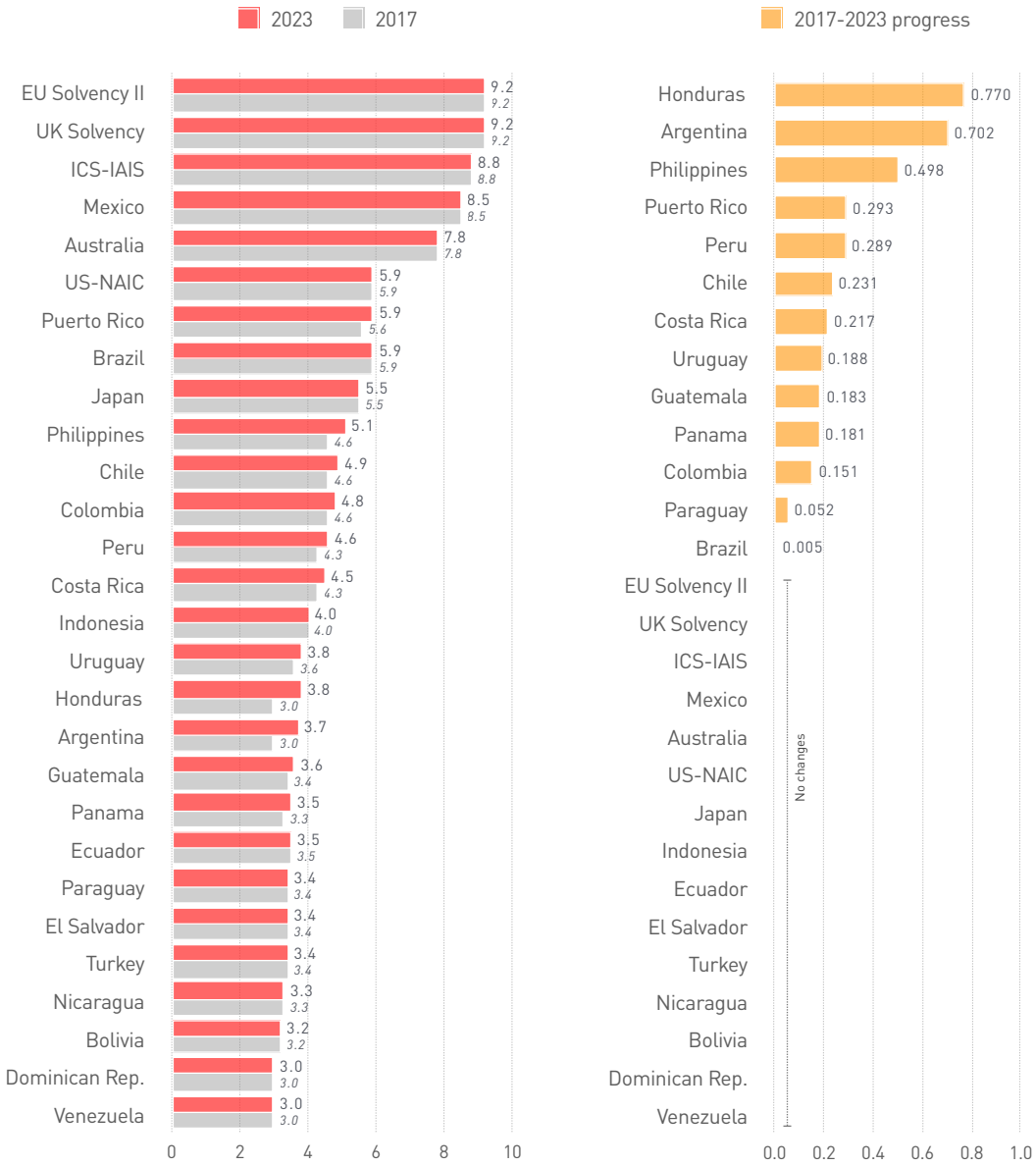
As confirmed, the model followed by modern risk-based solvency systems is based on three pillars: quantitative, governance and supervision (or qualitative), and market transparency. Systems further developed towards a purely risk-based prudential regulatory system (such as Solvency II or the future IAIS PCR) are characterized by having broadly developed the first pillar (quantitative), which is based on a solvency ratio in which a greater number of risk factors are considered by the prudential regulation. They introduce more complex scenario simulation techniques for calculating certain specific capital weights for underwriting, market, and credit risk, risk interdependence, the use of internal models subject to authorization, and the calculation of regulatory solvency capital at group level, among others. Furthermore, these systems usually include explicit risk

Chart 5.1-a
Analyzed models: Risk-Based Regulation Proximity Index (I-RBR)



Source: MAPFRE Economics

Chart 5.1-b
Analyzed models: change in Risk-Based Regulation Proximity Index (I-RBR), 2017–2023



Source: MAPFRE Economics

assessment measures, with a predefined time horizon and confidence level, such as value at risk (normally the VaR or, to a lesser degree, tail VaR), which would apply both in the calculation of capital under standard formulas (when the respective factors or scenarios are calibrated under this explicit measure) or employing total or partial internal models.

Solvency ratio

On the other hand, the solvency prudential supervision framework in place in the European Union (Solvency II), as well as the ICS that is being finalized by the International Association of Insurance Supervisors (IAIS), well reflect the model followed in modern risk-based solvency

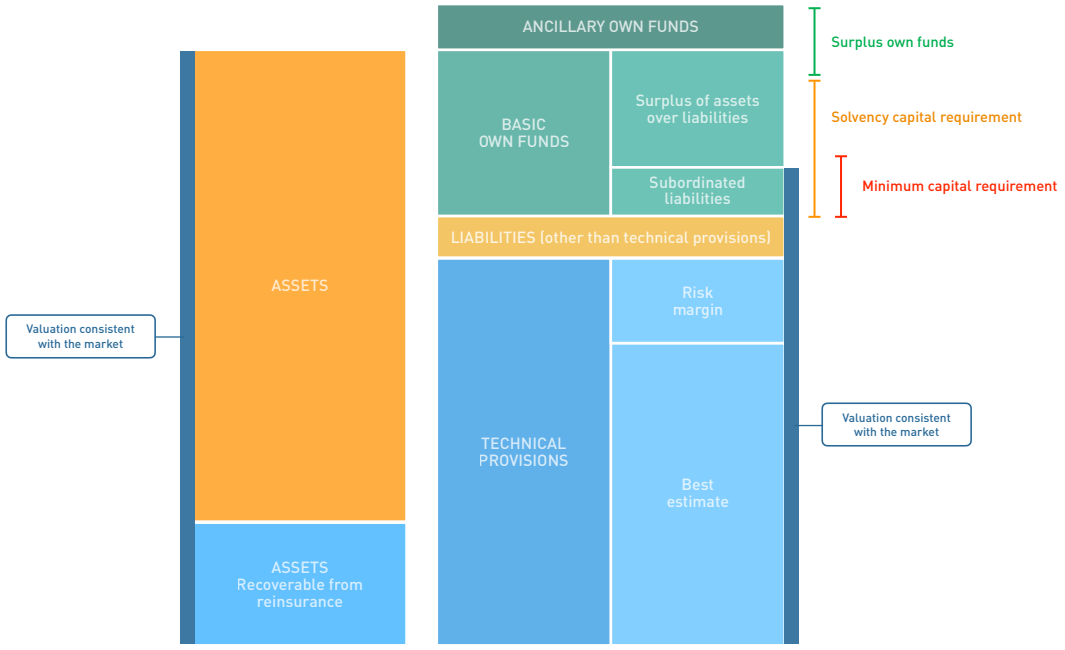
systems with quantitative requirements that establish the standards for calculating the solvency ratio by dividing eligible own funds by the solvency capital requirement.

Eligible own funds

As shown in Chart 5.2-a, in those systems, a comprehensive approach of total balance sheet surplus valuation and market-consistent valuations ("total balance sheet approach"), sensitive to the quality of the equity under consideration ("tiering"), is followed when calculating eligible own funds. An important issue in prudential regulatory systems concerns asset and liability valuations. More modern regulatory systems (as occurred with Solvency II) tend to break away from valuations appearing on insurance companies' and their groups' financial statements, replacing them with market-consistent valuations. Traditional accounting valuations tend to be made for purposes that are not necessarily aligned with valuations for solvency purposes, incorporating elements based on the principle of prudent accounting that prevent the determination of their economic value. Thus, in accordance with the new regulatory systems, and in order to avoid duplicated calculations and improve transparency in terms of the risk levels assumed by insurance companies, the prudential element must be considered exclusively when calculating capital requirements with the metric and confidence level decided upon, such as value at risk "VaR" or "tail VaR," and not in the valuation of assets and liabilities (as opposed to the valuation of surplus).

Thus, when calculating the economic valuation of own funds, "market consistent valuations" are considered for assets and liabilities, which, in the case of obligations arising from insurance contracts, results in a calculation based on the best estimate and a risk margin that aligns their valuation with a transfer price between independent parties. In these "pure" systems,

Chart 5.2-a
Solvency II: economic balance sheet, own funds, and risk-based capital requirements



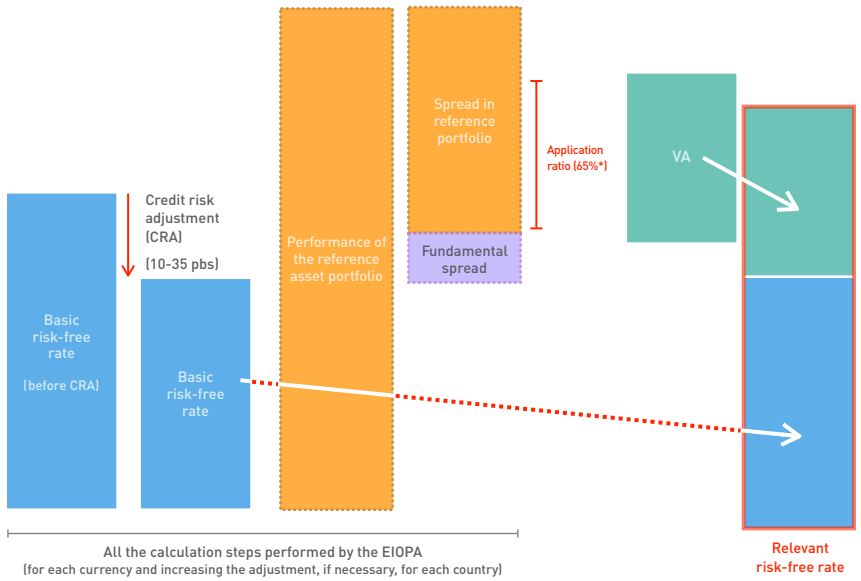
Source: MAPFRE Economics (with information from the European Commission)

prudential margins should not be considered in the valuation of assets and liabilities, as such margins are taken into consideration exclusively for the purpose of calculating regulatory capital with the determined metric (VaR, tail Var) and not when calculating eligible own funds.

However, these regulatory frameworks sometimes move away from a "pure" market valuation model and consider the medium and long-term institutional investor nature of insurance companies and their groups, allowing them to make some adjustments in the valuation of their liabilities, taking into account that the payment flows they manage are highly predictable (except in some more complex portfolios). The financial assets backing them can be held until payments are due, without having to make forced sales of these assets in the event of turbulence in the financial markets.

This type of liability valuation adjustment can be made generically, as in the case of the *volatility adjustment* established by the Solvency II regulations, which is calculated according to the risk profile of a representative portfolio of the aggregate investments of the insurance industry in the European Union for each of the main currencies, and with an additional adjustment based on the investment profile of the insurance companies in each country. Thus, as it is based on aggregate portfolios of the industry determined by the European Insurance and Occupational Pensions Authority (EIOPA) with information the insurance companies and their groups are required to provide, all the elements necessary to adjust the valuations come from EIOPA, which publishes them monthly. In principle, this adjustment is not subject to eligibility criteria on the insurance liabilities to which it can be applied, but it does entail a certain baseline risk, in the event that the profile of the specific investment portfolio of the insurance company applying it deviates from the risk profile of the industry investment portfolio considered by EIOPA. Therefore, a percentage lower than one hundred is applied when calculating the adjustment (see Chart 5.2-b).

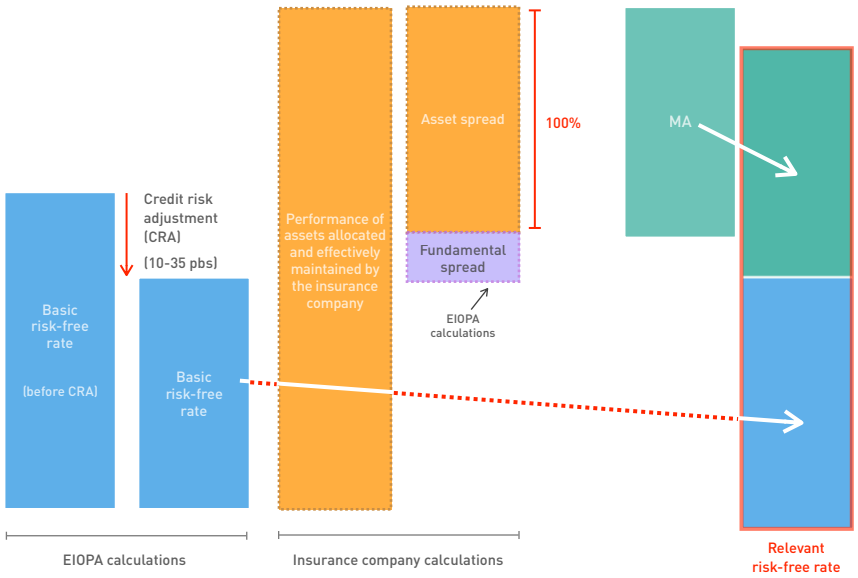
Chart 5.2-b
Solvency II: calculation of the volatility adjustment (VA)



Source: MAPFRE Economics (with information from the European Commission)

*The Solvency II amendment agreement increases this percentage to 85%, which will apply when it enters into force (expected in 2026).

Chart 5.2-c
Solvency II: calculation of the matching adjustment (MA)



Source: MAPFRE Economics (with information from the European Commission)

However, it is common for the regulatory framework to provide for an alternative adjustment based on the actual investment portfolio backing the insurance liabilities, as occurs in Solvency II with the so-called *matching adjustment*. As it is based on the risk profile of the specific financial investments backing the insurance obligations, many of the elements necessary for the adjustment calculation are made by the insurance companies themselves based on their portfolios. This adjustment is subject to a series of eligibility criteria that must be met by both the insurance obligations to which the adjustment is applied and the underlying investment portfolios (see Chart 5.2-c). It also requires the supervisor's prior authorization.

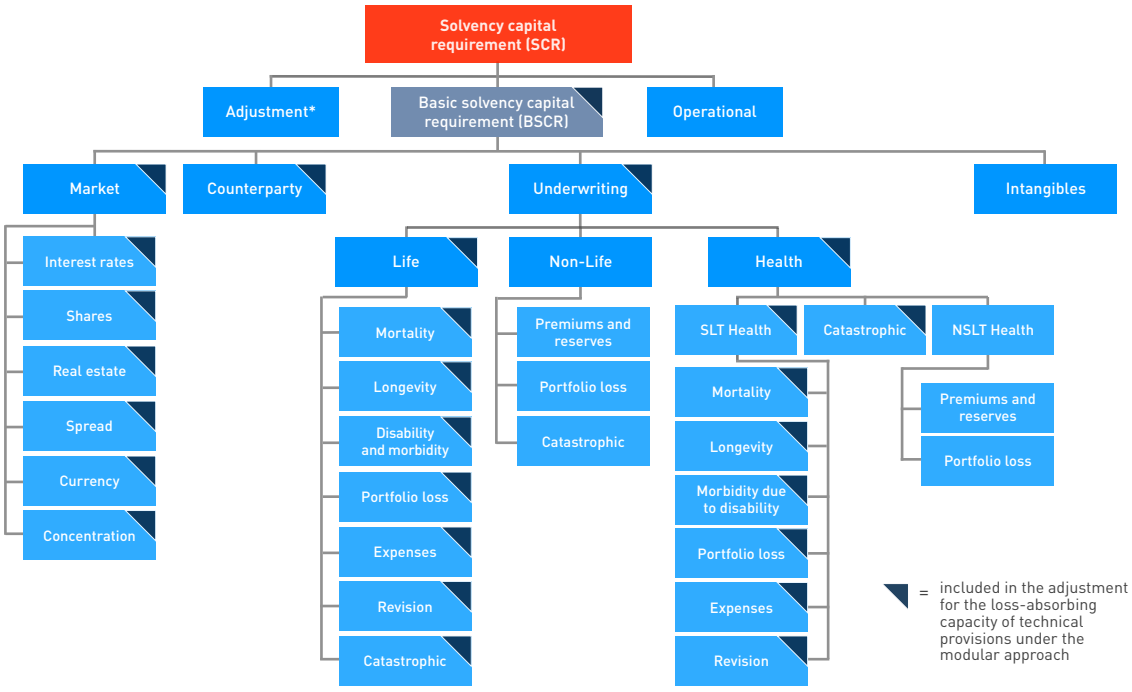
It should be noted that these types of valuation adjustments to insurance bond portfolios (technical provisions) are also included in the capital standard being developed by the IAIS (the ICS), the latest version of which (Candidate ICS, developed from ICS Version 2.0) is pending final modifications with completion targeted by the end of 2024. The IAIS Candidate ICS considers up to three different groups of policies in the adjustment calculation (Three-Bucket Approach): the General Bucket, the Middle Bucket, and the Top Bucket.

There are certain eligibility criteria for both the insurance obligations that can be included in the IAIS Middle Bucket and Top Bucket (stricter for the latter) and for the financial assets that can be used to back these insurance obligations. The Candidate ICS takes the Version 2.0 criteria as a basis, but the criteria are still being refined before the final standard is approved under the name Prescribed Capital Requirement (PCR).

Solvency capital requirement

The risk-based solvency capital requirement (SCR) is calculated modularly, normally calibrated according to a one-year value at risk (VaR) methodology with a 99.5% level of confidence (see Chart 5.2-d). Internal models may alter the modular structure of the standard formula or the aggregation matrices constructed based on their own calculation of the risk correlations, but not the confidence level based on any of the VaR or tail VaR calculation methodologies.

Chart 5.2-d
Solvency II: risk mapping for the solvency capital requirement according to standard formula



Source: MAPFRE Economics (with information from the European Commission and the European Insurance and Occupational Pensions Authority)
*Adjustment for the loss-absorbing capacity of technical provisions and of deferred taxes.

5.3 Asymmetric progression toward a risk-based regulatory system

As stated throughout this report, under Solvency I-type systems, the most important factor in determining the solvency capital requirement is the underwriting risk, with a system based on one or more factors applied to magnitudes considered representative of the level of exposure to insurance risk (premiums and loss ratios in the case of Non-Life insurance, and mathematical provisions and/or capital at risk in the case of Life insurance). In order to control other risks (such as financial risks) in this type of system, additional standards have been introduced related to governance, specific regulatory limits on diversification and dispersion in investment portfolios, limits in the reduction of capital requirements due to the reinsurance effect, and a closed-list classification of assets suitable to cover the obligations arising from insurance contracts. Moreover, these Solvency I-type systems are characterized by the introduction of prudential elements in the valuation of assets and liabilities, as well as strict standards regarding supervisory authorization and/or communication prior to launching new products on the market.

The recent phase of development towards risk-based regulations is still underway, with varying levels of maturity in different geographical areas, depending on the size of the markets and, more structurally, on the readiness of the industry and supervisors to provide the institutional and market infrastructure necessary to implement more modern models. Regulatory systems with static capital requirements are gradually evolving toward dynamic models in most of the insurance markets analyzed. However, in most cases certain static requirements have been maintained as an absolute minimum that must be met, and they sometimes still apply to smaller insurance companies that, due to the size of

Table 5.4
Main precautionary and intervention measures considered in risk-based regulation of insurance activity

Ascending range of cautionary and intervention measures
• Normal off-site supervision actions (monitoring of indicators).
• *General* on-site review (inspection under general review parameters).
• *Specific* on-site review (inspection under review parameters for specific aspects).
• Meeting with the general manager or management of the insurance company.
• Meeting with the company's external auditors.
• Meeting with the actuaries or supervisors who design the technical notes for insurance products.
• Meeting with the actuaries or supervisors responsible for the valuation of technical provisions.
• Meeting with the company's internal auditor.
• Meeting with the company's audit committee.
• Meeting with the supervisors of the company's risk unit or area.
• Meeting with the company's board of directors.
• Modifying how frequently financial and technical information is provided to the supervisory body (less frequently than expected for companies with no issues).
• Imposing additional capital requirements depending on deviations from the risk profile.
• Requesting that the insurance company prepare a recovery plan (correcting irregularities).
• As appropriate, applying sanctions to the company, executives, or members of the board.
• Starting the process of reporting crimes, if applicable.
• Imposing a short-term financing plan on the company so that it can recover its solvency position.
• Limiting the registration or authorization of new insurance products.
• Suspending or limiting the payment of dividends to the company's shareholders.
• Limiting the free disposal of assets.
• Suspending or limiting the payment of bonuses to the company's executives.
• Reducing the writing or retention of premiums and/or accepting reinsurance operations at levels compatible with the company's financial resources.
• Transferring the company's technical risks portfolio, or undertaking actions to assess its merger with another company.
• Instructing the company to inform its insured parties of non-compliance with the recovery plan in the period agreed upon with the supervisory body.
• Requesting an ex ante resolution plan for the company.
• Moratorium on policy surrender rights.
• Restructuring of technical liabilities (adjustment to insured parties' benefits).
• As applicable, reporting to other financial regulators (local or foreign) on the issues facing the company.
• Reporting to competent auditors on possible non-compliance with other regulations to which the company is subject (e.g., tax, data protection, etc.).
• Replacing the company's executives.
• Intervening in the company and replacing the governing bodies.
• Removing authorization to operate and liquidating the company.

Source: MAPFRE Economics

their balance sheets or their volume of operations, are not large enough for dynamic requirements to come into play.

In this asymmetric progression, the most advanced risk-based regulatory solvency capital systems seek to adapt capital requirements to the risk profile of each insurance company. Thus, they seek a more efficient allocation of capital within levels of confidence that are considered adequate to protect policyholders. One of the basic concepts behind these regulatory systems lies in the fact that treating all insurance companies the same, regardless of their risk profile, could create a barrier to entry for certain businesses and an inefficient allocation of resources, thus negatively impacting market development.

Moreover, these new, more modern systems are characterized by various supplementary elements: a greater number of risk factors; the introduction of more complex scenario simulation techniques for calculating the specific capital risk weights for underwriting, market, and credit risk; consideration of risk interdependence; the use of internal models, and the calculation of regulatory solvency capital at the group level, among others. As discussed later in this report, one factor with a determining influence on the degree of progress towards risk-based regulations is the difficulty of developing an adequate institutional and market infrastructure for their implementation. Thus, alongside the development of these institutional and market preconditions, a considerable number of jurisdictions have been introducing elements related to qualitative risk management and internal calculation requirements for the institutions, under concepts such as ORSA (Own Risk and Solvency Assessment) or ERM (Enterprise Risk Management).

5.4 Precautionary and intervention measures

Finally, it should be noted that an important part of the design and implementation of risk-based regulatory systems lies in the consideration of precautionary and intervention measures in the event of impairment in the solvency of insurance companies or their groups. These measures are usually designed in the form of an intervention ladder, depending on the severity of the situation. Thus, a solvency ratio of less than one would result in the supervisor taking precautionary measures. In some systems, like the NAIC standard in the United States, measures are considered even in earlier phases, when the ratio begins to deteriorate, even if it is not less than one. In the case of the Solvency II system, there is a second intervention level of another magnitude, called the minimum capital requirement (MCR), which is calculated quarterly, and when not fulfilled, results in the adoption of more urgent and severe measures by supervisors. Table 5.4 contains a summary list of the principal measures included in the systems analyzed in this report.

6. Preconditions for risk-based regulation: public policy elements

The analysis carried out in this report confirms that implementing risk-based regulations requires a series of institutional and market preconditions. These elements must guide public policy action in order to create the necessary environment and infrastructure to properly implement this type of insurance solvency regulation system. As discussed in the initial section of this study, the move towards risk-based regulation offers the advantage of aligning regulatory standards with a pro-competitive environment that provides a market advantage (in the form of lower capital risk weight) to participants who better manage their risks. Thus, risk-based models and the way risks are managed (identified, measured, mitigated, and dispersed) align the prudential objectives of the regulation (which seek to protect insurance companies' financial condition and solvency position) with incentives to stimulate market competition.

However, moving from basic risk (Solvency I-type) models to more sophisticated risk-based regulation (Solvency-II type) models implies not only their determination by the supervisor, but also, in a more structural sense, a series of preconditions being met so that the regulatory adjustment process is beneficial for market operations (greater efficiency and competition), for the stability and integrity of the insurance industry and financial system, and ultimately for policyholders. In a broad sense, this set of preconditions can be seen as the development of both the institutional and market infrastructure necessary for the different elements that make up this regulatory framework to operate harmoniously, producing the desired positive effects.

6.1 Institutional preconditions

First, adopting risk-based regulations involves not only technical and organizational demands on the various market participants, but also a supervisory body and supervision process that is well-structured, efficient, and consistent with the needs and requirements of a risk-based regulatory system. One parameter of how this institutional precondition should be met is provided by two of the Insurance Core Principles (ICPs)[32] produced by the International Association of Insurance Supervisors (IAIS), a global organization mandated to set standards for the supervision of insurance markets.

These principles provide, among other things, that the main goal of supervision should be to help maintain a fair, secure, and stable insurance industry for the benefit and protection of policyholders. Therefore, the legislation must clearly define the authority responsible for insurance supervision, as well as the goals of insurance supervision and the mandate and responsibilities of the supervisory body, granting it sufficient powers to carry out this process, such as the powers to issue provisions and to enforce them through both administrative and immediate actions.

Additionally, the foregoing principles establish more specific aspects regarding the scope of operation of the body responsible for supervising the insurance market. The following are some noteworthy examples: First, the governance structure of the supervisory body must be clearly defined, including internal procedures to ensure the integrity of its actions, stressing that the lines of command must be structured in such a way that these actions can be taken

immediately in the event of an emergency. Second, there must be explicit procedures for the appointment and removal of the head of the supervisory body and, if applicable, the members of its governing body, stressing that in the event of removal, the reasons must be made public. Third, the institutional relationship between the supervisory body and the executive and judicial branches of government must be clearly defined and transparent. Fourth, the supervisory body and its staff must be free from any undue political, governmental, or insurance industry interference in the performance of their responsibilities, emphasizing that the supervisory body must be financed in a manner that does not undermine its independence and must be able to allocate its resources in accordance with its mandate and objectives, as well as the risks it perceives. Fifth, the regulatory requirements are clear and transparent, and the supervisory body applies them consistently, considering the nature, scale, and complexity of the insurance companies, and mechanisms are in place to appeal its decisions. Sixth, the supervisory body and its staff must protect the confidentiality of the information in their possession as part of the supervisory process. And finally, the supervisory body shall have appropriate and sufficient financial and human resources to carry out its duties.

It is evident from this set of requirements that having a supervisory framework and a duly established and efficient supervisory body (in terms of applicable international standards) are institutional preconditions of the utmost importance. In risk-based models, the supervisor must have both the necessary technical capabilities and a flexible, efficient operating scheme that allows it to react in a timely manner to situations in which supervised institutions face risk environments that significantly affect them and could jeopardize the stability and integrity of the market and, ultimately, the interests of policyholders. Therefore, these preconditions must be included in explicit public policies that seek to satisfy them appropriately.

6.2 Market preconditions

There is also a series of preconditions for the implementation and proper functioning of a risk-based regulatory framework that essentially have to do with insurance companies, which must adhere to it, and the insurance market as a whole. These preconditions, which are illustrated on Chart 6.2, can be grouped according to the general components of risk-based regulatory frameworks (illustrated in the aforementioned Chart 1.3-b), i.e., quantitative requirements, governance requirements, product and competition requirements, and market disclosure. As in the case of institutional preconditions, creating the market environment that satisfies them involves the design and implementation of explicit public policies.

6.2.1 Quantitative requirements

Statistical information that permits risk modeling

In terms of quantitative requirements, risk-based regulations emphasize an accurate measurement of the risks (technical and financial) to which an insurance company is subject, and the dependence between them, as a way to establish both the level of technical provisions and capital risk weight. These measures employ intensive statistical techniques in the use of information. The same applies to qualitative requirements, in which adequate risk management by insurance companies is based on the possibility of using these types of quantitative analysis techniques.

Therefore, an indispensable precondition for the application of a risk-based regulatory system is the existence (in the form of a public good available to all market participants) of sufficient, reliable, timely, and homogeneous statistical information on the insurance operation to enable the modeling of inherent financial and technical (underwriting) risks. This information must also include sufficiently

Chart 6.2
Overview of institutional and market preconditions linked to the implementation of risk-based regulations

Source: MAPFRE Economics

broad and detailed series and be produced on a continuous basis.

Professionals with training, knowledge, and skills to perform the risk modeling tasks

Risk modeling as a basis for determining technical provisions and establishing capital risk weight, and to support appropriate risk management by insurance companies, requires human resources with the necessary training, knowledge, and skills to do so. This need requires the labor market (and consequently the country's educational system) to provide professionals with these profiles (actuaries, mathematicians, and in general, professionals skilled in quantitative techniques) on a continuous basis.

It is important to point out that these professional profiles will be required by both the supervisory body and the insurance industry, and demand for them may increase as these types of measurements are internalized in companies' operations and as the market grows. In addition, the market itself may require these types of professional profiles to perform parallel duties, such as those related to external auditing, consulting, and external analysis.

Sufficiently developed financial markets permitting an efficient asset and liability management (ALM) process

Adequate risk management requires the existence of efficient financial markets whose level of development permits the performance of an efficient asset and liability management (ALM) process. This process involves matching the terms, duration, and interest rates of obligations derived from insurance policies and insurance company investments. Therefore, it is not enough to have adequate knowledge of the features of the company's technical liabilities; there must also be efficient financial markets whose level of development makes it possible to have investment instruments that allow for this efficient ALM process. In this context, the absence of or barriers to access a sufficiently developed financial market could impede or hinder this process, which is key to adequate risk management.

In addition, the ALM process requires a regulatory framework that does not establish limitations (outside the logic of insurance regulation) on the acquisition of financial assets available in the financial markets (*e.g.*, financial assets in foreign currencies). The existence of such limitations would impede or significantly hinder the ALM process and thus the proper implementation of risk-based regulation.

Absence of legal barriers to conduct reinsurance operations permitting the adequate dispersion and mitigation of technical risks

The risk management process resulting from this new type of regulatory framework in the context of technical (underwriting) risks involves the need to transfer these risks appropriately so that, through mutualization with other risks in the international arena, their potential effects on the company that has assumed them directly can be mitigated. Therefore it is essential that there are no legal barriers (outside of the logic of insurance activity regulation) that hinder or limit the performance of reinsurance operations with international companies.

In this sense, legal barriers to reinsurance operations should be eliminated, so as to allow for the adequate dispersion and mitigation of technical risks so that, by means of mutualization with other risks in the international arena, their potential effects on the company that has assumed them directly can be mitigated. This need is growing, considering the increase in the frequency and intensity of catastrophic natural events that we have been experiencing in recent decades.

6.2.2 Governance requirements

Development of the business culture and maturity in companies' organizational culture

Solid governance is one of the key and most complex aspects in the implementation of risk-based regulatory systems. This is because, unlike aspects linked to quantitative requirements (where the determining factor involves the availability of information and application of appropriate quantitative techniques), governance touches on aspects related to companies' organizational culture and, in a broader sense, to the development of corporate culture in the insurance market in question. Therefore, the process of developing better governance of insurance companies involves not only the definition of a regulatory framework that clearly establishes these responsibilities, but also the development and maturation of these responsibilities in their operating environment.

Thus, progress in the implementation of risk-based regulatory models requires the development of this organizational and business culture, so that boards of directors are in a position to formally and truly assume a leading role in companies' management process, focusing on adequate risk management. It is therefore a process of regulatory adaptation that cannot take

place in a short period of time, but rather involves organizational adaptation and maturation to allow the internalization of regulatory standards. This process can only take place on solid foundations in the medium term, as demonstrated by mature regulatory systems that have evolved in this direction.

Administrators and board members with knowledge and experience in risk management

As in the case of quantitative requirements (risk modeling as a basis for determining technical provisions and establishing capital risk weights), risk management from insurance companies' governance perspective entails the need for administrators and board members with knowledge and experience not only in insurance matters, but also in the management of technical and financial risks. Thus, in compliance with this precondition, the need for the labor market to be able to provide executive-level professionals with these profiles would also apply.

6.2.3 Products and competition

Absence of limitations on product rate adjustments as part of efficient risk management

One of the main features of risk-based regulatory systems is that they seek to align the goals of prudential regulation (preservation of the companies' financial and solvency position) with incentives to stimulate competition as a way to increase market efficiency and thus benefit policyholders. Within this framework, an essential precondition for the appropriate implementation of this type of regulatory system concerns the absence of legal limitations (beyond those implied by the prudential logic of a solvency regulation) on companies making adjustments in their product pricing. This is one of the fundamental tools for both protecting companies' financial and solvency position when certain financial and underwriting risks materialize, and reacting to competitive market behavior.

6.2.4 Disclosure to the market

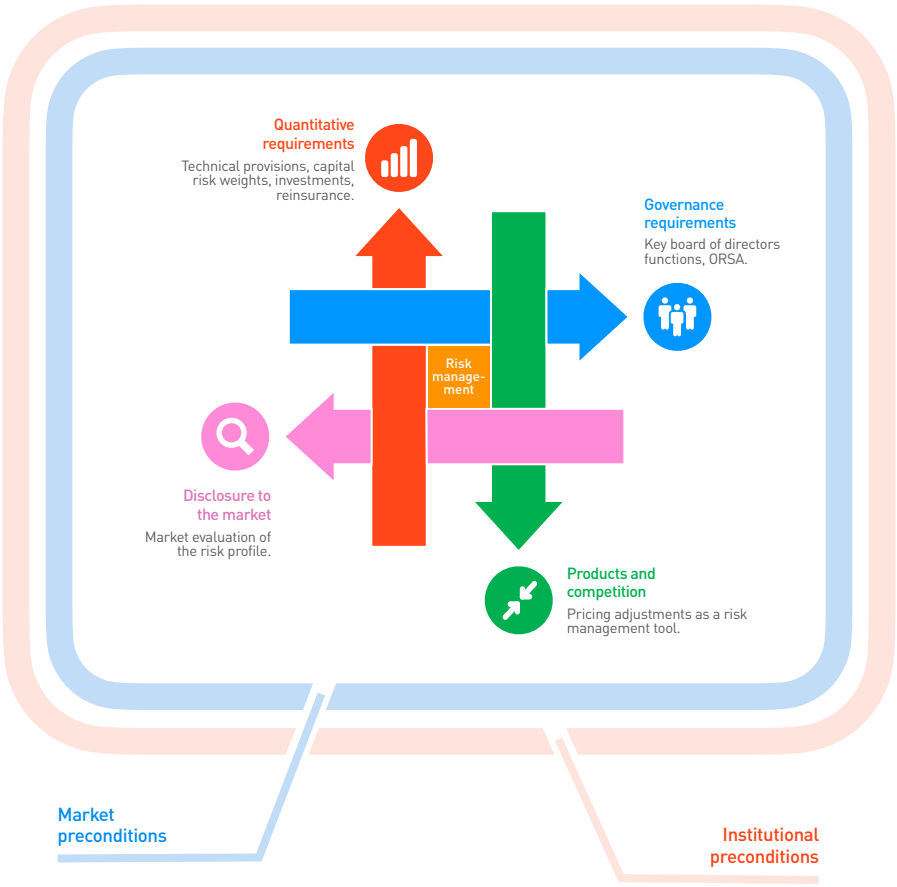
Valuation mechanisms that permit the operation of a market discipline mechanism

Risk-based regulation models seek to supplement the elements of regulatory discipline imposed by quantitative requirements and the self-discipline implicit in the enhancement of governance, stimulating market discipline through increased disclosure of information. Although it is evident that for this mechanism to operate, institutions must disclose more information to the market, this condition is not sufficient. As a precondition for this, the market must have mechanisms in place that allow for the valuation of this information. Economic theory suggests several, ranging from the creation of a stock exchange listing by insurance companies or the issuing of publicly traded debt (in which the price of shares or debt becomes an indicator of the companies' perceived financial strength and solvency) to the existence of rating agencies that carry out systematic evaluations of the institutions in the sector, or financial analysts who use the information disclosed by companies to provide an ongoing market analysis.

6.3 General scheme of a risk-based regulatory model and its preconditions

Schematically, and in line with the conceptual framework set out at the beginning of this report, Chart 6.3 highlights how, in risk-based regulatory models, *risk management* is the core that determines the essential aspects of the different standards that comprise them. Thus, in terms of quantitative requirements, risk management is the basis for determining the levels of technical provisions and capital risk weights, as well as the investment and

Chart 6.3
General diagram of a risk-based regulatory model and its preconditions



Source: MAPFRE Economics

reinsurance policy. In terms of governance requirements, risk management is at the heart of the board's duties and the company's management. In terms of products and competition, risk management determines the features of the products offered, their pricing, and their impact on market competition. Furthermore, in terms of disclosure, risk management is a central element when the market, supervisors, and consumers assess companies' performance. This is all subject to the existence of both institutional and market preconditions that make it possible for risk-based regulations to be implemented effectively and efficiently. In fact, we can affirm that the fulfillment of preconditions that permit an effective, efficient risk management function determines the speed and likelihood of further progress on this type of regulatory model. On the contrary, moving forward on the implementation of this type of regulatory system before these preconditions are met could limit the benefits of its introduction and, under certain conditions, even create undesired effects that hinder the market's operation.

6.4 Final remarks

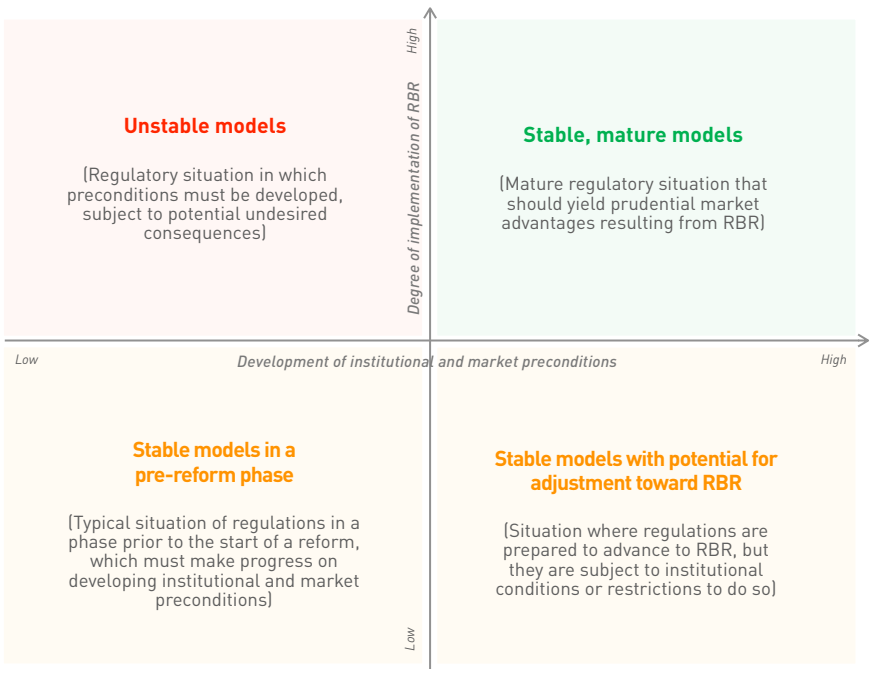
While it is true that risk-based regulatory models, by attempting to align the prudential objectives of regulation with the incen-

tives for a pro-competitive environment based on efficient risk management, can improve the performance of insurance markets, these models are complex and require the existence and development of new institutional and market infrastructure, thus involving lengthy design, implementation, and internalization processes. Thus, in emerging markets, the first phase of implementing risk-based regulations must involve the development of these institutional and market preconditions, which requires public policies and a medium-term coordinated effort between financial authorities and the insurance industry. To provide an overview of the different starting points for implementing risk-based regulations, Chart 6.4 features a classification combining both the fulfillment of the necessary institutional and market preconditions for their adequate implementation and the degree to which regulatory standards of this type have been effectively implemented.

In an ideal situation, there would be a balanced progression between the development of these preconditions and implementation of risk-based regulatory standards, which ensures mature and stable regulatory systems (upper right quadrant). Two other situations, also stable, are illustrated in the lower left and right quadrants. The first case refers to markets in stages prior to regulatory reform, where the necessary institutional and market preconditions have not yet been developed, and no progress has been made in the implementation of risk-based regulatory standards. The second case refers to markets where the preconditions are sufficiently developed, but which (for institutional reasons) have not yet made progress in the implementation of pure risk-based regulatory standards, although they would be in a position to do so.

The case of unstable regulatory models is illustrated in the upper left quadrant.

Chart 6.4
Types of regulatory models based on the development of institutional and market preconditions and degree of implementation of risk-based regulations (RBR)



Source: MAPFRE Economics

These are regulations where progress has been made in the implementation of risk-based standards, but certain institutional or market preconditions have yet to be sufficiently developed. Therefore, these are situations in which the effectiveness of regulatory standards is limited by insufficient institutional and market infrastructure, in which regulatory implementation, under certain conditions, could lead to undesired consequences that limit or affect market performance.

In view of the foregoing, we can conclude that existence of the institutional and market preconditions that allow the risk management function to be carried out effectively and efficiently determines the speed and likelihood of moving toward risk-based regulatory models. Taking steps to adopt this type of regulatory system before these preconditions are met may limit the benefits of their implementation while creating undesired effects that hinder the operation of the insurance market.

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