
Fundación MAPFRE
GLOBAL SAVINGS AFTER THE PANDEMIC AND INSURANCE INDUSTRY INVESTMENTS
MAPFRE Economics
WASHINGTON
ONE CORONA
CORONAVIRUS
COVID-19
THIS NOTE IS LEGAL TENDER FOR ALL DEBTS, PUBLIC AND PRIVATE
Treasurer of the United States.
SERIES 1996
FRANKLIN
SERIES 2006
Secretary of the Treasury.

Global savings after the pandemic and insurance industry investments

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MAPFRE Economics

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Introduction

This report, which expands on and updates the information contained in the insurance industry investment reports produced by MAPFRE Economics since 2018, offers an overview of the distribution and risk profile, depending on asset type, of the investment portfolios of insurance companies, in a selection of markets in major regions around the globe. This includes markets in the eurozone, the United States, Japan, the United Kingdom, Spain, Brazil and Mexico. As in past editions, this report also includes an analysis of the investment portfolios of a selection of large European insurance groups, including information on the credit rating of the portfolios in which they invest.

As has been highlighted in reports prepared by MAPFRE Economics, and especially in analyzing the investments of insurance companies, it must be stressed that this industry is recognized as one of the main institutional investors at the global level. However, unlike other financial institutions, the insurance business model calls for the implementation of liability-driven investment strategies, with the objective of achieving an adequate match in terms of maturity, currency and interest rates between the liabilities assumed and the investment instruments behind them. In this way, the insurance industry contributes to the consolidation of capital through a steady inflow of resources for the long-term financing of projects that promote economic growth, and also supports the stability of the financial system by providing a mechanism that reduces procyclicality at times of crisis.

Furthermore, in this version of the report, we have included a preliminary analysis of global savings following the COVID-19 pandemic, which has affected the world economy over the past two years. This analysis, which offers an overview of the main factors that have affected the volume of savings during the crisis caused by the pandemic, both from the perspective of developed economies and emerging economies, also makes it possible to understand the relevance of the insurance industry as one of the main collectors of savings and, therefore, as medium and long-term institutional investors.

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Executive summary

During the two years of the COVID-19 pandemic, financial markets were driven by different factors. On the one hand, central banks expanded monetary contributions in the form of government bond purchases and certain corporate bonds that kept market interest rates low. On the other hand, these central bank actions, together with government tax stimulus programs put in place to mitigate disruptions in economies, have found their way into the real economy and other assets as well. This circumstance has been reflected in the dissonance between the strong valuation of stock markets and the real economy, which contracted in many countries due to the mobility restrictions imposed. This massive flow of money has also fueled the rise in value of many other assets (not just real estate) and intensified the already "emerged" inflation.

Furthermore, the sudden economic crisis caused by the pandemic, compounded in recent months by the impact caused by the Russian invasion of Ukraine, have had consequences that go beyond merely affecting the prices and income of economic agents. The loss of activity, on the one hand, and the successive shocks, on the other, have had a significant impact on the factors that determine the supply of private savings, such as demographic structure or the value over time of the savings themselves (represented by the term structure of interest rates, which is the same as equating the supply of savings to demand for investment). In truth, the final result of this shock will only be calculable in the future, although it is possible to get a preliminary idea of what this phenomenon will mean when it comes to the performance of the global economy.

The crisis triggered by the COVID-19 pandemic initially had an impact on three relevant channels when it comes to savings. First of all, by impacting *activity levels*, *income and liquidity.* Secondly, aversion to risk caused by uncertainty. And thirdly, demographics through the one-off impact on the population's *life expectancy*. This is in addition to the crisis caused by the invasion of Ukraine, which aggravated the dynamics that were brewing as the worst part of the pandemic was coming to an end, reopening the wounds left by COVID-19.

This complex economic context has had a significant impact on savings. On the one hand, the increase in uncertainty saw households *exercise more caution when it came to savings.* These savings were possible, in some cases, thanks to the transfer of State income to families in the form of support during the pandemic, which by no means circumvents the problem of the resulting increase in tension as regards fiscal stability. It should be noted that in many emerging countries, as there was not enough fiscal space to accommodate the shock, with the impact being felt directly by the population, private savings had to be used, intermediated by the finance sector. Furthermore, these shocks also affected *corporate savings* (in the form of undistributed profits), the dynamics of which were different depending on the economic spe-

cialization of each region and the severity of the containment or confinement measures employed during the pandemic.

The crisis generated by the pandemic also generated a demographic structure shock. COVID-19 was particularly lethal among the elderly, causing a one-off decrease in life expectancy and a reduction in the upper bands of the population structure; this situation is particularly evident in developed countries compared to emerging countries. Thus, the average age of those who passed away as a result of the pandemic was higher in countries in which income was higher, which was determined by the population structure and the capacity to prevent and respond to the pandemic in each country. This situation meant that the lethality and mortality of the crisis was heterogeneous in different age groups of the world's population, with a larger proportionate impact on the active population (under 65) the lower the country's income, and vice versa.

As a result, in higher-income regions, the savings required to cover the life cycle (*Modigliani savings*) fell (as the ratio between a person's remaining time working and total remaining time fell), while in countries with a lower income, this increased (as a higher proportion of the active population passed away). In other words, as a result of the economic impact of the pandemic, countries with a higher income needed less structural savings, while countries with a lower income needed a greater volume of savings. Therefore, the *savings gap* decreased in developed countries while it increased in emerging countries.

One of the alternatives to help reduce this *savings gap* in emerging countries (as evidenced in relatively more developed countries) is through the insurance industry, which plays an important role as a provider of retirement savings and a funder of medium- and long-term investments, in addition to being a countercyclical element at times of greater financial tension. The insurance industry's liability-driven investment strategy, focused on long-term investments, requires an investment in relatively liquid instruments, with a low credit risk and with similar terms to those of its liabilities.

Against this backdrop, the new weighting of insurance companies' portfolios between different asset types tends to be marginal, given the need to match terms, rates and currencies with their liabilities and given the consumption of capital. Therefore, generally speaking, the changes between asset categories in this sector tend to be small scale. However, underlying this stability between asset classes, within the fixed income category, there are new weightings, in particular in duration (mitigation of interest rate risk), in anticipation of changes in market rates and central banks (caused by inflation) and also, reweighting in relation to credit ratings (mitigation of issuer credit risk).

This report provides a comparative view of the distribution and evolution over time of investments of insurance companies, by type of assets, in a selection of markets, including both developed markets (Japan, the eurozone, the United States, the United Kingdom and Spain) and emerging markets (Brazil and Mexico). As can be seen in Table S-1, this is a set of markets that offer a different level of relative development. It focuses on the cases of the United Kingdom and Japan, in which the weight of the investments managed in relation to their gross domestic product (GDP) is higher, together with the eurozone and United States markets, which are the ones with the highest volume of investments managed in absolute values.

Where possible, information on investments in these markets is presented by distinguishing the traditional investment portfolio (in which the investment risk is retained in the balance sheet of insurance companies) from the portfolio that sup-

Table S-1
Selected markets: investments managed by the insurance industry, 2020
(millions of euros)

Market	Investments	GDP	% of GDP
United Kingdom	2,626,172	2,399,747	109.4%
Japan	3,689,133	4,468,046	82.6%
Eurozone	8,479,914	11,390,802	74.4%
United States	6,583,692	18,503,936	35.6%
Spain	311,315	1,121,948	27.7%
Brazil	203,983	1,279,472	15.9%
Mexico	60,788	951,081	6.4%

Source: MAPFRE Economics (with data from EIOPA, ICEA, BoS, NAIC, SUSEP, CNSF, LIAJ, GIAJ and IMF)

Table S-2
Selected markets: structure of investment portfolio by insurance business type, 2020
(%)

Type of business	Eurozone	United States	United Kingdom	Spain
Traditional business portfolio	83.3%	69.1%	45.3%	91.8%
Unit-linked business portfolio	16.7%	30.9%	54.7%	8.2%

Source: MAPFRE Economics (with data from EIOPA, BoS and NAIC)

ports products in which the policyholder is responsible for the investment risk, which we have called the unit-linked business portfolio (which includes both strict unit-linked products, and other variable annuity products, where there is also an assumption of investment risk by the insurance policyholder, they are managed in separate accounts and investments are realized in mutual fund units).

This distinction in the markets is shown in Table S-2. Generally speaking, with the exception of the United Kingdom, the investments that back Life insurance, with the policyholders assuming the financial risk of the portfolios allocated to their policies, represent a significantly lower percentage than is the case of the traditional business; however, in 2020 they gained weight both in the eurozone (and particularly in Spain) and the United States, where typically, these are products known by the name of "variable annuities" where the policyholders assume the financial risks during the accumulation phase, to a greater or lesser extent, depending on the guarantees included.[1] In the United Kingdom, the percentage has fallen slightly, although it continues to be the market with the highest proportion of unit-linked products.

In investment life insurance portfolios of the "unit-linked" or similar type (including "variable annuities" products), the risk and investment decisions do not fall on the insurance company, but are affected by the decisions that insurance policyholders take. Therefore, the weights that each as-

Table S-3
Selected markets: disaggregated structure of traditional business investment portfolios, 2019-2020
(%)

Asset type	Eurozone		United States		Japan		United Kingdom		Spain	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Corporate fixed income	31.4%	31.2%	51.1%	46.4%	7.4%	7.1%	33.6%	33.5%	19.8%	19.8%
Sovereign fixed income	34.4%	33.3%	13.3%	16.2%	39.1%	38.4%	18.2%	18.1%	55.6%	55.0%
Equities	13.8%	15.4%	13.2%	13.6%	5.7%	7.2%	9.0%	7.7%	5.6%	5.7%
Loans	5.0%	5.1%	10.6%	10.1%	7.5%	7.0%	9.9%	10.6%	0.8%	0.6%
Cash and deposits	4.8%	4.6%	4.1%	4.9%	3.6%	3.4%	8.7%	9.4%	6.4%	6.5%
Real estate	2.1%	2.3%	0.6%	0.6%	1.7%	1.6%	1.9%	1.6%	3.5%	3.5%
Other investments	8.6%	8.0%	7.2%	8.3%	35.0%	35.4%	18.7%	19.0%	8.2%	8.8%

Source: MAPFRE Economics (with data from EIOPA, ICEA, BoE, NAIC, LIAJ, and GIAJ)

set category represents have been calculated once the traditional investment portfolio has been calculated. This method of presenting the information is based on the idea that in traditional (i.e. not unit-linked or variable annuity) portfolios, it is appropriate to distinguish the investment typology, with a view to defining the nature of the risk taken on by the insurance companies.

As a result, the highest level of breakdown of the portfolios for comparative purposes (with a breakdown of corporate fixed income investments) has been achieved for the markets in Japan, the eurozone, the United States, the United Kingdom and Spain (see Table S-3). This information focuses on the United States insurance market, due to the predominant weight that investments in corporate fixed income have in this market, well above the other insurance markets of developed economies, although at the end of 2020, they represented a somewhat lower weight than at the end of the previous fiscal year (46.4% vs 51.1%). The depth and breadth of the capital market in this country offers more opportunities to find this type of issue to invest in, with a wide variety in terms of duration and credit quality level.

The Japanese insurance market, meanwhile, continues to have a high percentage of foreign currency investments (included in the "other investments" category and that accounts for 26.0% of its total portfolio, having experienced an increase of 12 percentage points over the 2010–2020 period). Insurance companies in Japan have traditionally been an important source of investment for Japanese sovereign bonds and, in particular, "super-long-term government bonds" (JGBs). However, the current low interest rate environment has made it very difficult to maintain the return on investment while aligning the duration of assets and liabilities, keeping in mind that old portfolios with high guaranteed interest rates still remain. The reaction from insurance companies in this environment has been to increase their investments overseas, mainly in US bonds, in search of higher yields to meet their guaranteed interest obligations. This has caused insurers to be more exposed to international markets and to the risk of exchange rate fluctuations.

Among the developed markets considered in this report, the Spanish insurance market represents the highest proportion of fixed income in its investment portfolio, and also has the largest concentration of

Table S-4
Selected markets: summary of the investment portfolio structure by asset type, 2019-2020
(%)

Asset type	Eurozone		United States		Japan		United Kingdom		Spain		Brazil		Mexico	
	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020
Fixed income	66.3%	66.2%	64.4%	62.6%	46.5%	45.5%	51.8%	51.6%	75.5%	74.9%	91.7%	91.0%	79.9%	80.8%
Equities	15.9%	15.5%	13.2%	13.6%	5.7%	7.2%	9.0%	7.7%	5.6%	5.7%	7.4%	8.0%	15.7%	15.1%
Loans	5.0%	5.7%	10.6%	10.1%	7.5%	7.0%	9.9%	10.6%	0.8%	0.6%	0.0%	0.0%	2.1%	1.8%
Cash and deposits	4.2%	4.2%	4.1%	4.9%	3.6%	3.4%	8.7%	9.4%	6.4%	6.5%	0.3%	0.2%	0.8%	0.9%
Real estate	2.4%	2.4%	0.6%	0.6%	1.7%	1.6%	1.9%	1.6%	3.5%	3.5%	0.1%	0.6%	1.4%	1.4%
Other investments	6.2%	6.0%	7.2%	8.3%	35.0%	35.4%	18.7%	19.0%	8.2%	8.8%	0.5%	0.0%	0.1%	0.1%

Source: MAPFRE Economics (with data from EIOPA, ICEA, BoS, LIAJ, GIAJ, NAIC, SUSEP and CNSF)

Table S-5
Selected markets: asset reassignment, 2010-2020

Asset type	Period	United Kingdom	Japan	Eurozone	United States	Spain	Brazil	Mexico
Fixed income	2016-2020	-2.3%	-2.6%	1.8%	-3.3%	-0.9%	1.2%	-1.9%
Equities		-3.6%	0.2%	-2.4%	0.5%	0.9%	-1.3%	3.0%
Loans		3.2%	-1.8%	1.2%	0.4%	-0.2%	0.1%	-1.0%
Cash and deposits		1.2%	0.7%	1.4%	0.9%	-2.2%	0.0%	0.3%
Real estate		-0.7%	-0.1%	0.5%	-0.1%	-0.1%	0.3%	-0.1%
Other investments		2.2%	3.1%	-2.4%	1.6%	2.5%	-0.3%	-0.3%
Fixed income	2010-2020	-	-5.5%	4.7%	-8.9%	-0.8%	0.2%	-3.0%
Equities		-	0.7%	-7.4%	5.1%	-9.0%	-8.3%	4.6%
Loans		-	-6.1%	-3.7%	1.0%	0.6%	0.0%	-1.1%
Cash and deposits		-	0.4%	0.7%	0.4%	0.7%	-0.1%	0.1%
Real estate		-	-0.7%	-0.1%	-0.2%	-0.4%	8.8%	-0.7%
Other investments		-	11.6%	5.8%	2.6%	8.8%	-0.6%	0.1%

Source: MAPFRE Economics (with data from EIOPA, ICEA, BoS, LIAJ, GIAJ, NAIC, SUSEP and CNSF)

sovereign fixed income. However, if the Brazilian and Mexican insurance markets are considered, they have higher percentages of investments in fixed income securities than the Spanish market. Thus it is observed that in insurance markets with a lower relative level of development (by asset volume in their portfolio), the percentage of investments in fixed income securities tends to be higher.

In addition, Table S-4 provides a breakdown by asset type of the investment portfolio structure for all the markets analyzed. The high level of concentration of fixed income investment (both corporate and sovereign) throughout the sample comprising the analysis stands out. As mentioned previously, this predominance can be explained to a large extent by the fact that the insurance business model involves the need to implement liability-driven investment strategies in order to achieve an appropriate match in terms of maturity and interest rates between recognized liabilities and the investment instruments that back them up.

As part of a medium-term analysis, during the 2016-2020 period, it can be seen that the changes between asset class is somewhat higher than in the 2019-2020 period, although these remain limited. Only when looking at a longer period, from 2010 to 2020, are there greater changes; however, these are more attributable to information supply classification criteria rather than actual shifts between asset types, with certain exceptions, as in the case of Japan, as

Table S-6
Selected markets: fixed income reassignment, 2016-2020

Asset type	United Kingdom	Japan	Eurozone	United States	Spain
Corporate fixed income	-0.1%	0.1%	-0.7%	-3.8%	-2.6%
Sovereign fixed income	-1.1%	-2.7%	0.6%	0.6%	0.1%

Source: MAPFRE Economics (with data from EIOPA, ICEA, BoE, LIAJ, GIAJ and NAIC)

explained in section 2 of this report. In this sense, it is worth mentioning the entry into force of the Solvency II regulatory framework; this occasion saw classification factors combine with the reassignment of assets to adapt to the new risk-based capital environment and market-consistent valuations (see Table S-5).

As part of this medium-term analysis, certain stability in the weight of sovereign and corporate fixed income can be seen in the fixed income category (see Table S-6), with the biggest shift coming in the loss of the relative weight of corporate fixed income in the United States which, in any case, remains the predominant investment in the country, as can be seen in Table S-3 mentioned above.

Moreover, the third section of this report includes an analysis of investment portfolios from a selection of international insurance groups, with the information taken from their consolidated accounts referring to the close of 2020. This analysis also offers comparative information about the rating of fixed income assets and the changes compared to the previous year, in order to provide a more in-depth view when comparing their risk profiles.

1. Global savings after the pandemic

The sudden economic crisis caused by the enforcement of lockdown and social distancing measures to overcome the COVID-19 pandemic, combined in recent months with the impact caused by the Russian invasion of Ukraine, has had consequences that go beyond merely affecting the prices and income of economic agents. The loss of activity, on the one hand, and the successive shocks, on the other, have had a significant impact on the determining factors of private savings, such as the demographic structure or the intertemporal value of the supply of savings (represented in the temporary interest rate structure, which is the same as equating the supply of savings to demand for investment).

In truth, the final result of this shock will only be calculable in the future, although it is possible to get a preliminary idea of what this phenomenon will mean when it comes to the performance of the global economy. This is because the phenomenon has short-term impacts on the economic cycle and; more importantly, on investment, productivity and long-term growth, in addition to the nominal and actual stability traditionally provided by the finance sector.

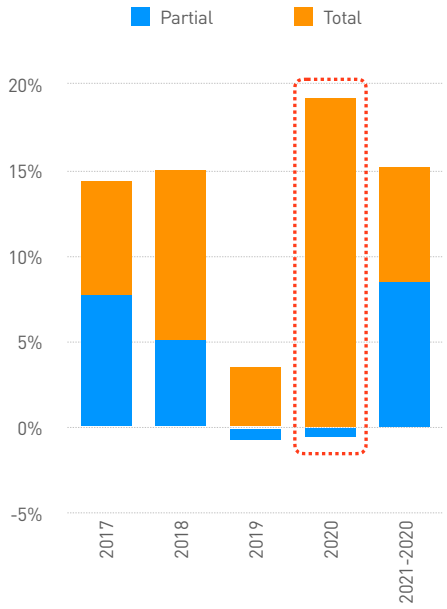
1.1 Impact channels via the chronology of the shock

The COVID-19 crisis: the germinal impact

The crisis triggered by the COVID-19 pandemic initially had an impact on three relevant channels when it comes to savings. First of all, *activity levels, income and liquidity.* Secondly, *aversion to risk* caused by uncertainty. And thirdly, demographics through the impact on the population's *life expectancy.*

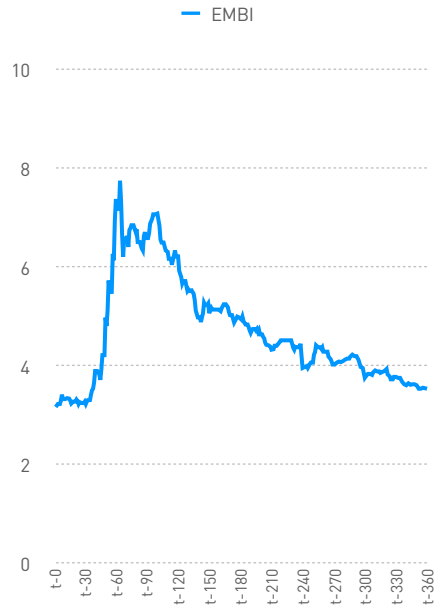
In relation to the first channel, from the perspective of *activity levels*, most economies in the world entered into a technical recession, as a result of the enforcement of lockdown measures and limitations on mobility and social contact. It should be noted that up until 24 February (date on which Ukraine was invaded) few countries had recovered their pre-pandemic levels of activity and the crisis unleashed (in particular in Europe) as a result of the invasion, will undoubtedly mean that this recovery will take longer to achieve.

Chart 1.1-a
Brazil: business recoveries
Life Brazil VGBL
(%, YoY)



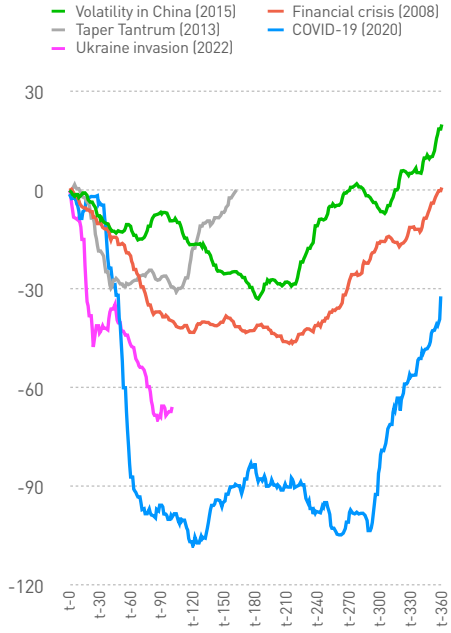
Source: MAPFRE Economics (with SUSEP data)

Chart 1.1-b
Evolution of the EMBI during the COVID-19 crisis



Source: MAPFRE Economics (based on Bloomberg data)

Chart 1.1-c
Portfolio investment flows in crisis and tensions in risk aversion



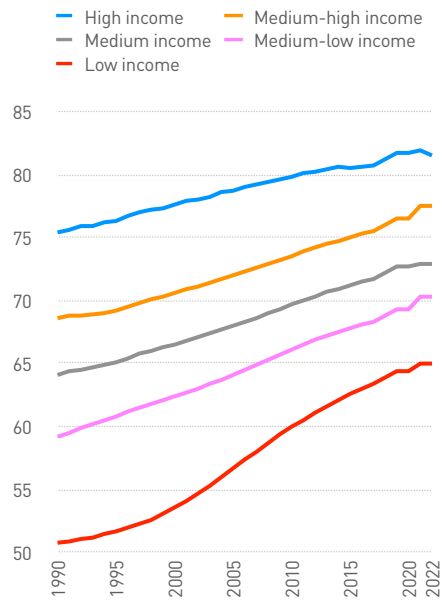
Source: MAPFRE Economics (based on IIF and Bloomberg data)

Simultaneous to the fall in economic activity as a result of the pandemic, there was an increase in *liquidity* needs. From the perspective of insurance activity, the dynamic of life insurance policy surrenders provides a good example of this phenomenon. This was particularly important for countries in which the use of public transfers was not as widespread, both due to the lack of fiscal space and economic policy decisions (see Chart 1.1-a, which demonstrates the case of Brazil). In regions with a greater fiscal margin, liquidity problems were eased by stimulus payments or State guarantees (for example, the United States and the eurozone), although this has given rise to a fiscal stability problem that is evident in some European economies, like the Spanish economy.

Secondly, the crisis caused by the COVID-19 pandemic, like all processes for which there is insufficient information, generated immeasurable uncertainty and, therefore, saw an upturn in risk aversion, which was more noticeable in emerging countries that in developed countries, as can be seen in the performance of the VIX and the EMBI over the course of the pandemic (see Chart 1.1-b). As is well known, risk aversion always pushes towards a sell-off in financial markets, with inevitable impacts on nominal variables, like asset prices and currencies, which ultimately affect the stability of countries that are more reliant on foreign savings (like Latin America); this is reflected in the flow of financing to these countries (see Chart 1.1-c, in which these portfolio flows during the COVID-19 crisis are compared to those caused by other global crises).

And, thirdly, the COVID-19 pandemic has an impact on demographics. The case rate and lethality of the pandemic was clearly much higher in older segments of the population and, therefore, reduced the elderly population,[2] while temporarily slowing down the increase in life expectancy. As was to be expected, this impact was higher in more vulnerable countries,

Chart 1.1-d
Global: the life expectancy at birth by economic grouping
(years)



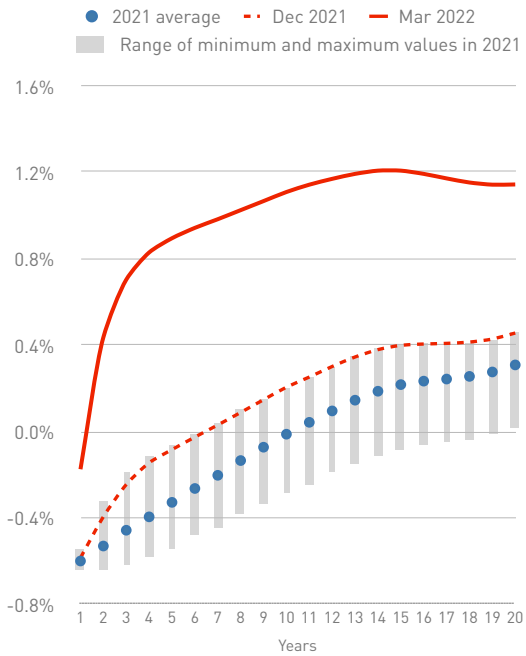
Source: MAPFRE Economics (with data from the World Bank and the UN)

i.e., where there were greater weaknesses in health systems.[3] As a result, as shown in Chart 1.1-d, the evolution of life expectancy by economic regions is now showing signs of a temporary slowdown in the life expectancy trend, although this is a trend whose depth and expanse will only be truly understood in the coming years.

The Ukraine conflict: turning the pressure up a notch

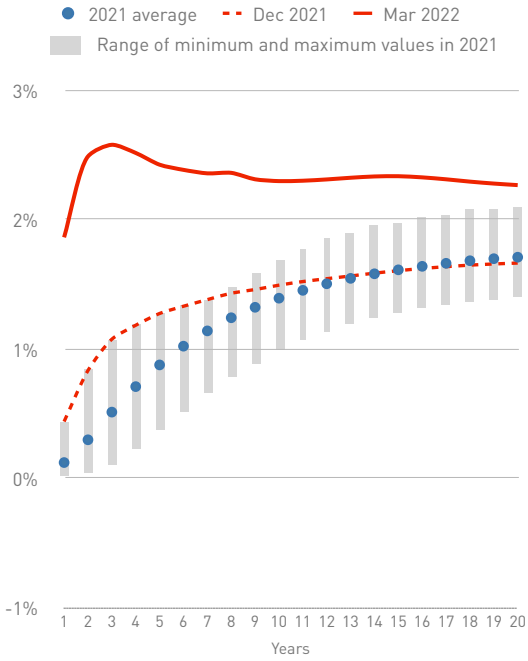
One of the most notable impacts of the restrictions imposed to combat COVID-19 was the impact on the global value chain. Throughout the pandemic, global logistics were hampered by successive lockdowns, like the type currently in place in China. These supply problems, combined with the shock to demand caused by the recovery from the crisis, represented two different sources of tension on production prices and global consumption, which were also stressed by the strength of the US dollar, which has acted as a safe haven asset.

Chart 1.1-e
Eurozone: risk-free yield curve
(%)



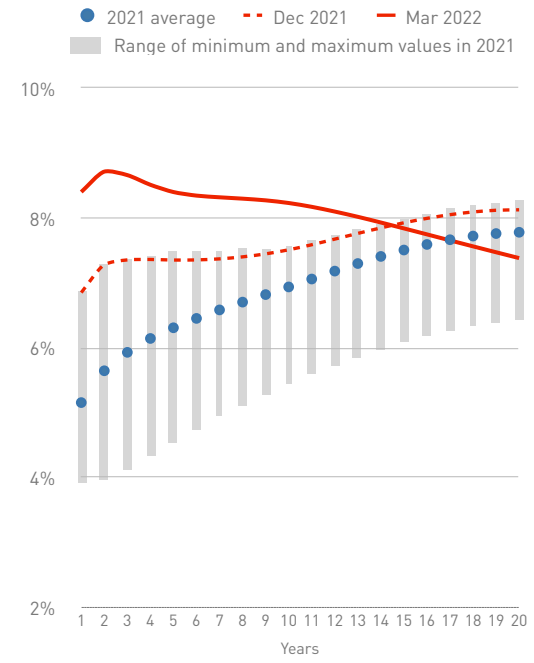
Source: MAPFRE Economics (based on EIOPA data)

Chart 1.1-f
United States: risk-free yield curve
(%)



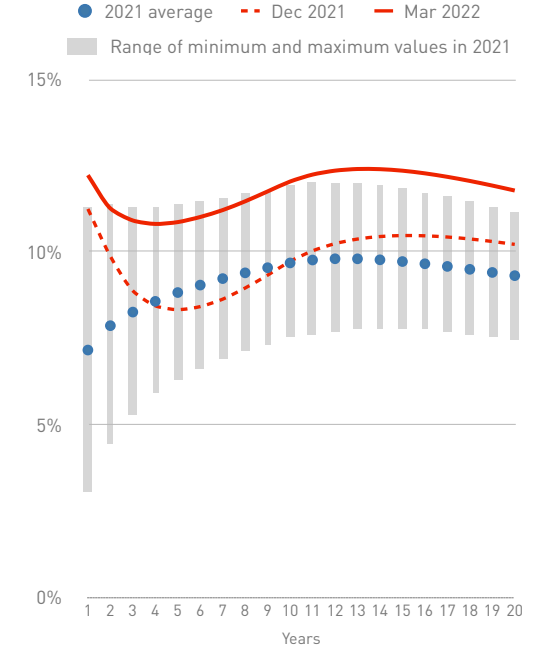
Source: MAPFRE Economics (based on EIOPA data)

Chart 1.1-g
Mexico: risk-free interest yield curve
(%)



Source: MAPFRE Economics (based on EIOPA data)

Chart 1.1-h
Brazil: risk-free interest yield curve
(%)



Source: MAPFRE Economics (based on EIOPA data)

Against this backdrop, the central banks of most global economies, with a particular emphasis on emerging countries, were forced to tighten their monetary policy, which in turn tightened financial conditions, as can be seen in the upturn in interest rates (see Charts 1.1-e to 1.1-h).

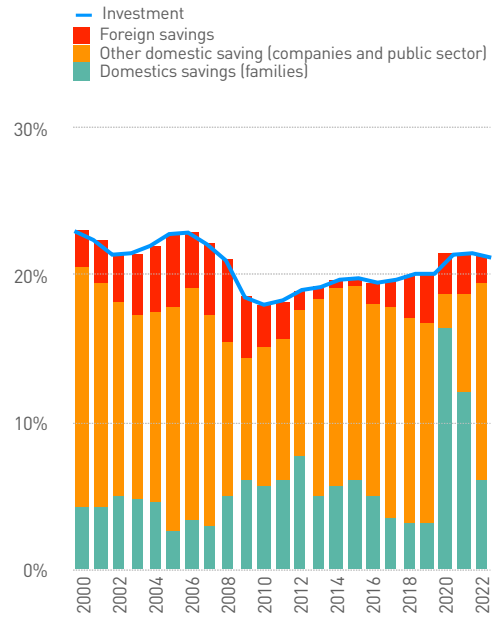
In this context, the crisis caused by the invasion of Ukraine aggravated the dynamics that were brewing as the worst part of the pandemic was coming to an end, reopening the wounds left by the COVID-19 crisis. As a result, economic activity slowed once more, delaying the recovery to pre-pandemic levels, while risk aversion increased once again. Furthermore, the energy price shock has quickly spread to the rest of the CPI, further stressing prices. Consequently, monetary and financial conditions are on the verge of being tightened once again (led by the United States and the United Kingdom in the developed world); ultimately, this will mean an increase in interest rates that savings and investment will need to adjust to.

1.2 Impact on savings

Impact on precautionary savings

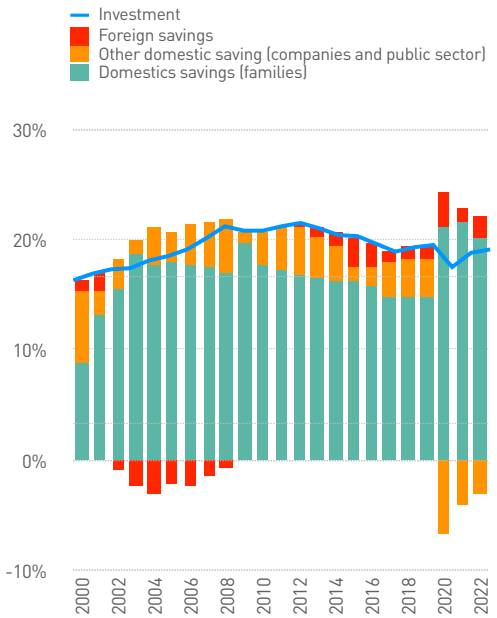
The complex economic environment caused by the COVID-19 pandemic, and exacerbated by the Ukraine conflict, have had a significant impact on savings. On the one hand, the increase in uncertainty saw households *exercise more caution* when it came to savings, as can be seen in the sharp increase between 2019 and 2020, both regionally and nationally (see Charts 1.2-a to 1.2-e). These savings were possible, in some cases, thanks to the transfer of State income to families in the form of support during the pandemic, which by no means circumvents the problem of the resulting increase in tension as regards fiscal stability. In many emerging countries, however, as there was not enough fiscal space to accommodate the

Chart 1.2-a
United States: savings and investment
(% GDP)



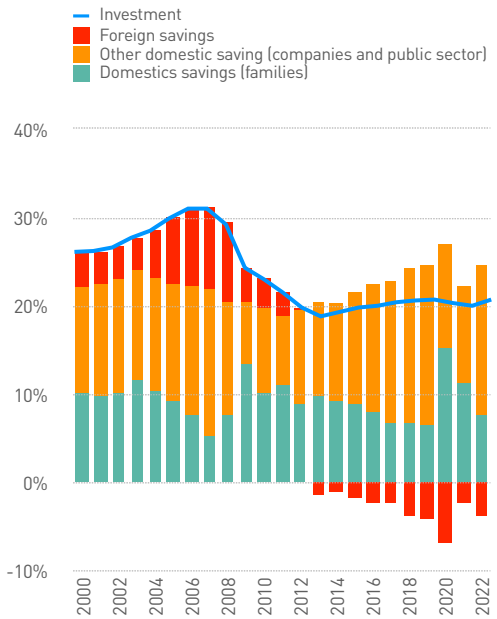
Source: MAPFRE Economics (with data from the World Bank)

Chart 1.2-b
Latin America: savings and investment
(% GDP)



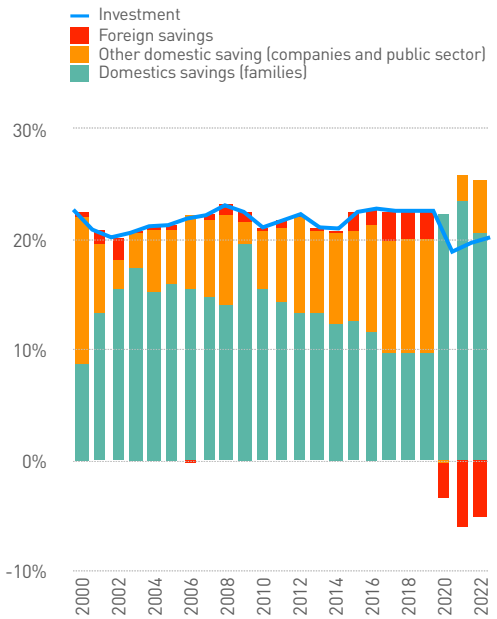
Source: MAPFRE Economics (with data from the World Bank)

Chart 1.2-c
Spain: savings and investment
(% GDP)



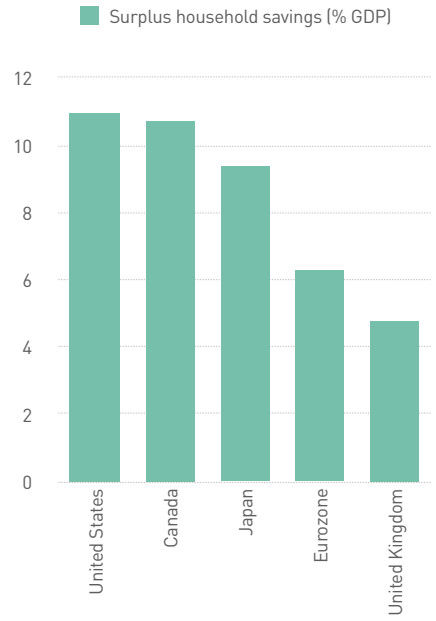
Source: MAPFRE Economics (with data from the World Bank)

Chart 1.2-d
Mexico: savings and investment
(% GDP)



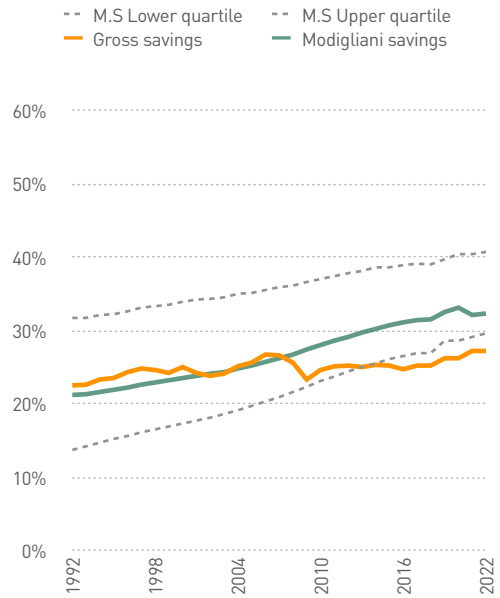
Source: MAPFRE Economics (with data from the World Bank)

Chart 1.2-e
Selected countries: surplus household savings



Source: MAPFRE Economics (with OECDE data)

Chart 1.2-f
Global: gross private savings vs Modigliani savings (% GDP)



Source: MAPFRE Economics (with data from the World Bank)

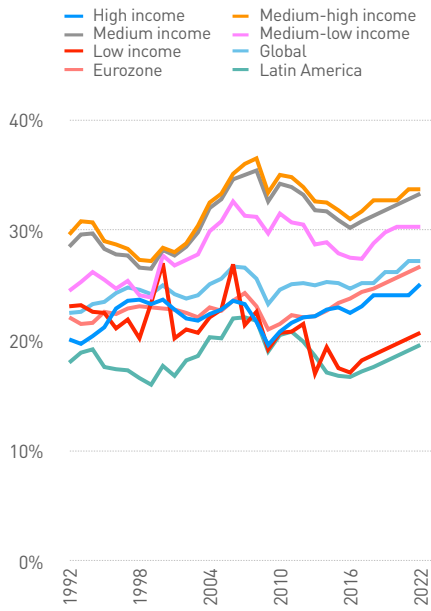
shock, with the impact being felt directly by the population, private savings had to be used, intermediated by the finance sector. It should be noted that a large part of private savings were liquidated as cash; one example of this is the dynamics of life insurance policy surrenders in Brazil, as can be seen in Chart 1.1-a, indicated above.

It must be noted that these shocks not only affected private household savings. The dynamics of *corporate savings* (in the form of undistributed profits) were also different depending on the economic strength of each region and the severity of the containment or confinement measures employed during the pandemic. As can be seen in Charts 1.2-a to 1.2-d, while in regions like Europe, these savings increased significantly on account of lockdown measures, the increase in the United States was much lower, as it was more inclined to pursue a business as usual strategy, thus fostering consumption.

Impact on Modigliani savings

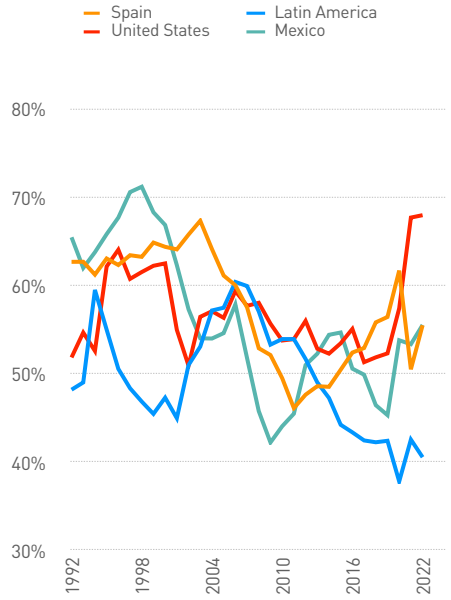
As mentioned previously, the crisis generated by the pandemic also caused a demographic structure shock, with one-off impacts depending on the capacity of the health systems of each country and their demographic structure.[4] COVID-19 was particularly lethal among the elderly (over 65 years old), causing a one-off decrease in life expectancy and a reduction in the upper bands of the population structure; this situation is particularly evident in developed countries compared to emerging countries. Generally speaking, the average age of those who passed away as a result of the pandemic was higher in countries in which income was higher, which was determined by the population structure and the capacity to prevent and respond to the pandemic in each country. This situation meant that the lethality and mortality of the crisis was heterogeneous in different age groups of the world's population, with a larger proportionate impact on the act-

Chart 1.2-g
Global: gross private savings by economic grouping
(% GDP)



Source: MAPFRE Economics (with data from the World Bank)

Chart 1.2-h
Selected economies: coverage of private savings*
(% coverage)



Source: MAPFRE Economics (with data from the World Bank)

*Gross private savings/ Modigliani savings

ive population (under 65) the lower the country's income, and vice versa.

As a result, in higher-income regions, the savings required to cover the life cycle (*Modigliani savings*[5]) fell (as the ratio between a person's remaining time working and total remaining time fell[6]), while in countries with a lower income, this increased (as a higher proportion of the active population passed away). On aggregate, the world has seen its *Modigliani savings* increase by approximately 1% (see Chart 1.2-f), although there are nuances based on region and income segment.

In other words, as a result of the economic impact of the COVID-19 pandemic, countries with a higher income needed less structural savings, while countries with a lower income needed a greater volume of savings. Therefore, the *savings gap* decreased in developed countries whereas it increased in emerging countries. The overall result was an increase in savings needs of around 1%, which remained unsatisfied, and therefore the *savings gap* increased and with it, the vulnerabilities associated with this type of phenomenon.

As reflected in Chart 1.2-g, the gross private savings of households and companies has grown consistently around the world, including during the pandemic and, as goes without saying, considering the different base income levels around the world. However, the dynamics of the structural *savings gap* (the difference between total gross private savings and the savings needed according to the *Modigliani savings metric*) have been quite different: as indicated previously, it is closing at increasing levels in accordance with income levels (see Chart 1.2-h).

A preliminary overview

COVID-19 has seen, on aggregate, an increase in structural needs for savings, as changes in demographics (affected by the pandemic) have not always been matched

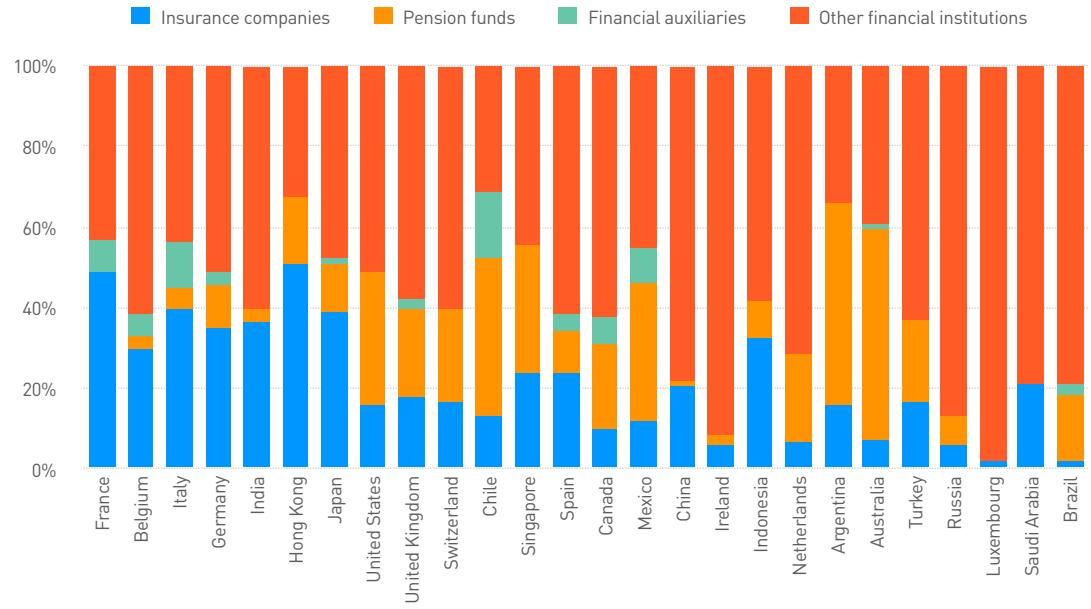
by an increase in savings. When broken down, it can be seen that higher-income regions did see a reduction in the *savings gap*, while lower-income and more vulnerable regions saw the gap increase, reflecting global savings problems. Although in aggregate terms there was no change, when looking at the data by region, the problem of having sufficient savings has suffered once again where they were most needed, i.e. in emerging countries (in particular Latin America) and, in general, in regions that are structurally reliant on foreign savings and where the intermediation of local private savings is required to finance investments and ensure the financial and actual stability of their economies.

The impact on savings has been reflected in the finance sector, in their transformative effect on investment and insurance terms, through investments with which assets and liabilities are paired in the financial system. As a result, shortcomings in savings impact the system's assets, in such a way that a reduction in the supply of savings means less investment in these assets and, therefore, less financing capacity in the real economy. This drop in supply is reflected in increases in interest rates and financing conditions in general and, ultimately, the destruction of demand for savings (investment).

As has been seen recently, global monetary policy has started to tighten up, although asymmetrically around the world. Latin America took the lead in tightening financing conditions during the early phases of the post COVID-19 recovery, specifically to alleviate its financing needs. Subsequently, the Ukraine conflict and spiraling energy prices, on the one hand, and the dynamism of demand in the United States, on the other, have seen financial conditions tighten even further.

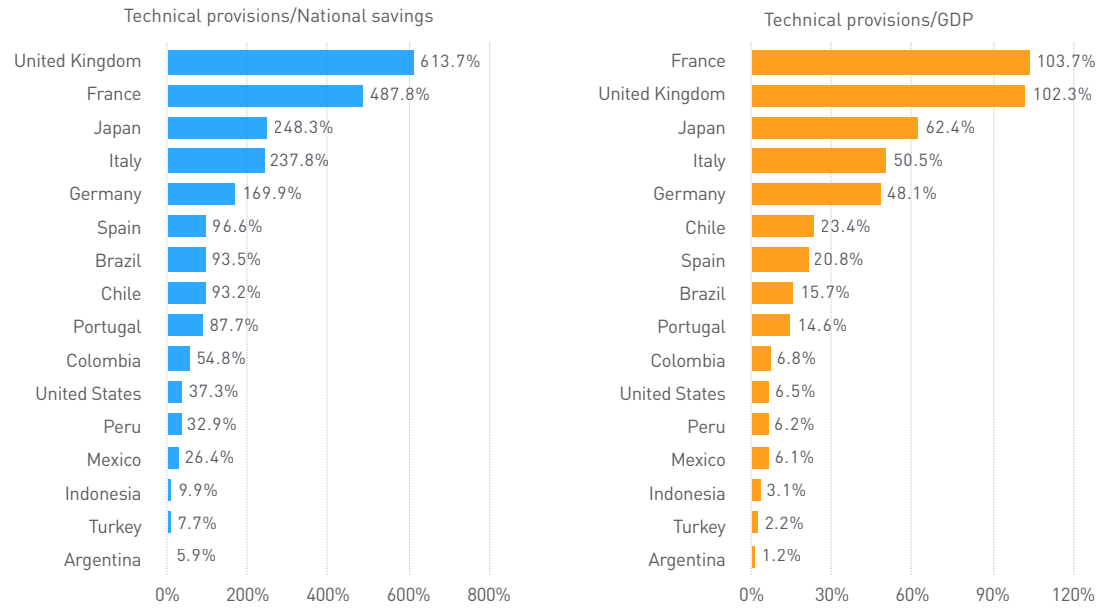
While the increase in interest rates depends on many factors, the *savings gap* is partly responsible for transferring the impact of interest rate increases throughout

Chart 1.2-i
Selected countries: composition of the non-banking private financial system
(% total domestic financial assets)



Source: MAPFRE Economics (based on Financial Stability Board data)

Chart 1.2-j
Selected countries: private savings intermediated by the insurance industry
(technical provisions, % national savings; technical provisions, % GDP)



Source: MAPFRE Economics (with 2020 data from the OECD, National statistics institutes, IMF, World Bank and Haver)

the curve. The greater the *savings gap*, the greater the horizontal travel in the interest rate curve, as it is more difficult to finance capital over its different time horizons. Ultimately, this leads to a downturn in investment, which in the short term is reflected in a decrease in activity and, in the long term, a reduction in potential economic growth as the speed at which capital stock is replenished and generated drops. Therefore, first COVID-19 and then inflation had profound effects on the structure of global savings, to the benefit of countries better prepared to cope with both shocks (those with a higher income), increasing the need for savings and reducing investment options and long-term growth in the most vulnerable countries.

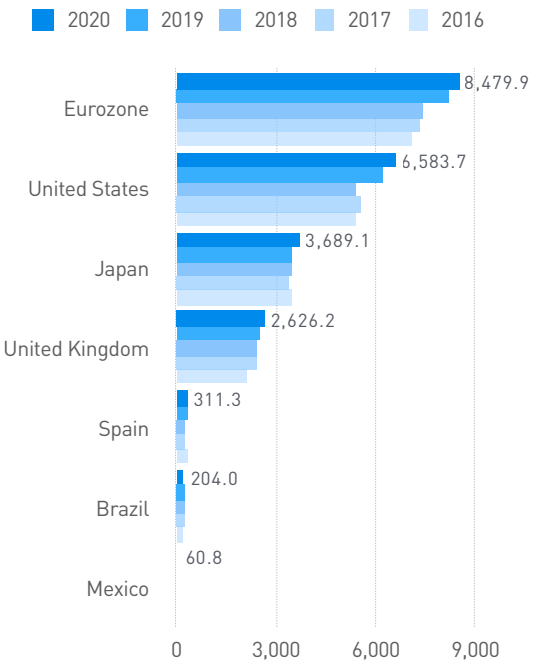
One of the alternatives to help reduce this *savings gap* in emerging countries (as evidenced in relatively more developed countries) is through the insurance industry, which plays an important role as a provider of retirement savings and a funder of medium- and long-term investments, in addition to being a countercyclical element at times of greater financial tension. As will be outlined in the second part of this report, the insurance industry's liability-driven investment strategy, focused on long-term investments, requires investment in relatively liquid instruments, with a low credit risk and with similar terms to those of its liabilities. As can be seen in Chart 1.2-i, although there are differences between economies, well developed insurance industries can play a key role in the process of acquiring and channeling non-bank savings, by accumulating investments linked to their insurance obligations that can account for major proportions of national savings and GDP, as demonstrated in the paradigmatic cases of the United Kingdom, France, and Japan (see Chart 1.2-j).

2. Structure of insurance industry investment portfolios in selected markets

As illustrated in Chart 2-a, the insurance markets taken into account for the analysis in this report, in their totality, represented an investment of 21.95 trillion euros in 2020. In general, due to the contraction of economies in 2020 as a result of the COVID-19 pandemic, the proportion of investments compared to GDP, spiked significantly in some cases, such as in the United Kingdom, where there was a 10 percentage point increase, to 109%, whereas in Mexico it increased by just 1 percentage point, to 6% (see Chart 2-b).

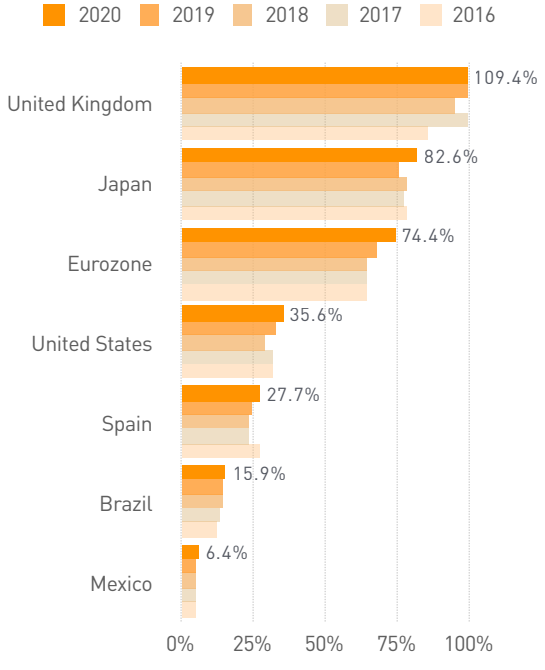
It should be noted that the information used as a basis for the analysis presented in this section of the report was provided directly by the relevant national or regional supervisory agencies. In case of the information for the eurozone market, the source was the European Insurance and Occupational Pensions Authority (EIOPA), for the United Kingdom, the Bank of England (BoE) and, in Spain, information obtained from the ICEA has also been used to analyze the evolution of the aggregate portfolio structure between 2010 and 2020. In the case of the United States insurance market, the information was taken from that published by the National Association of Insurance Commissioners (NAIC). In the case of Brazil, the source of the data was the Superintendency of Private Insurance (SUSEP), and for the Mexican market, the

Chart 2-a
Selected markets: investments managed by the insurance industry, 2016–2020
(billions of euros)



Source: MAPFRE Economics (with data from EIOPA, ICEA, BoE, NAIC, LIAJ, GIAJ, SUSEP and CNSF)

Chart 2-b
Selected markets: investments managed by the insurance industry as a share of GDP, 2016–2020
(% of GDP)



Source: MAPFRE Economics (with data from EIOPA, ICEA, BoE, NAIC, LIAJ, GIAJ, SUSEP, CNSF and IMF)

National Commission for Insurance and Securities (CNSF). Finally, in Japan, information from life insurance associations (The Life Insurance Association of Japan, LIAJ) and non-life insurers (The General Insurance Association of Japan, GIAJ) has been combined.

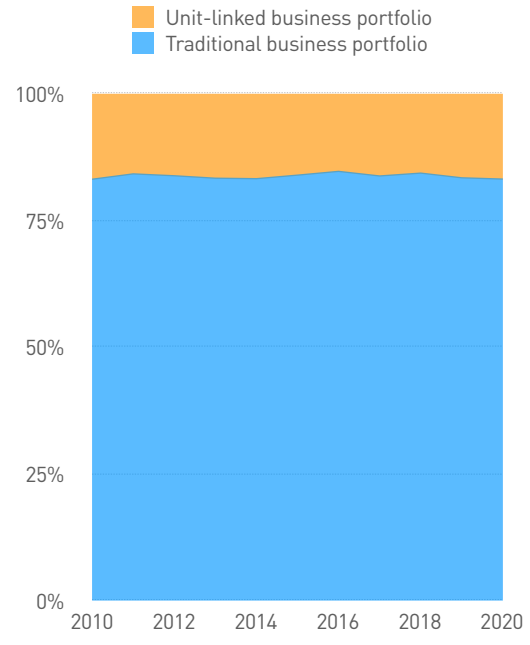
Thus, the following parts of this section provide a description of the evolution of investment portfolios in the insurance markets in Japan, the eurozone, the United States, the United Kingdom, Spain, Brazil and Mexico, with regard to the last decade. In the case of the eurozone, United Kingdom and Spanish markets, they also show a breakdown of the evolution of investment portfolios in terms of both traditional and unit-linked business over the same period.

2.1. Eurozone

For the totality of the insurance markets included in the eurozone (Austria, Belgium, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Portugal, Slovakia, Slovenia and Spain), Table 2.1-a and Chart 2.1-a show the evolution of investment portfolios broken down by type of insurance business (distinguishing between traditional and unit-linked business) between 2010 and 2020.

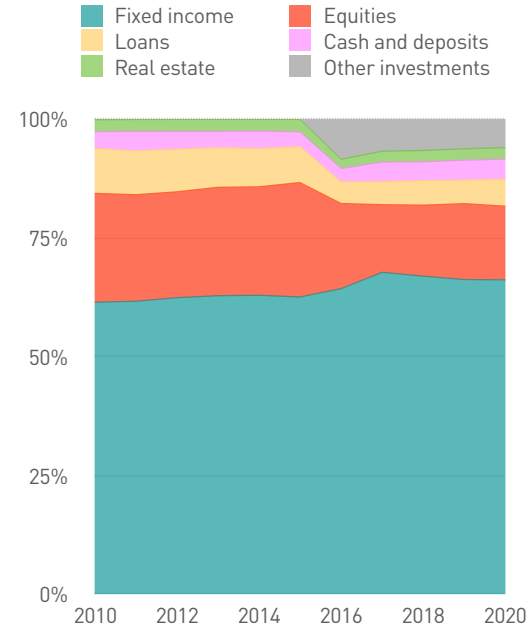
Throughout the entire 2010 to 2020 period, the "unit-linked" business portfolio ended up with the same weight as it did in 2010, 16.7%, although it varied by up to 2 percentage points during this period. In fact, in recent years, its weight has increased to this figure, having hit a minimum of 15.2% in 2016. The prolonged environment of low interest rates in the eurozone, together with the good performance of equity markets in recent years, have increased the demand for products in which the policyholder assumes the investment risk. However, this business faces competition in the market from investment products issued by other financial institutions, such as banks

Chart 2.1-a
Eurozone: structure of investment portfolios broken down by type of insurance business, 2010–2020
(%)



Source: MAPFRE Economics (with data from EIOPA)

Chart 2.1-b
Eurozone: structure of traditional business investment portfolio broken down by asset type, 2010–2020
(%)



Source: MAPFRE Economics (with data from EIOPA)

Table 2.1-a
Eurozone: structure of investment portfolios broken down by type of insurance business, 2010–2020
(%)

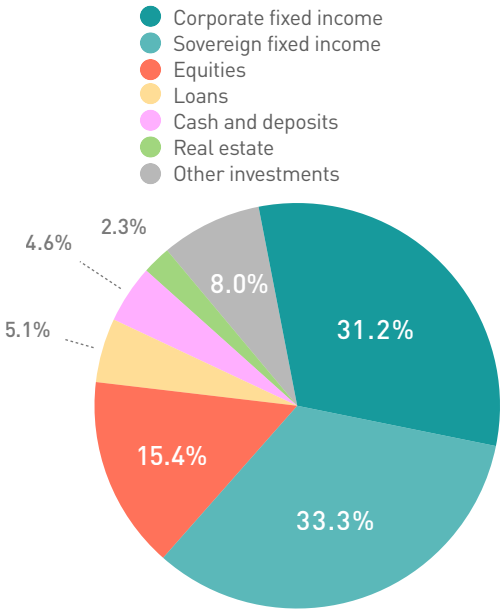
Type of business	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Traditional business portfolio	83.3%	84.3%	84.0%	83.5%	83.4%	84.1%	84.8%	83.9%	84.5%	83.6%	83.3%
Unit-linked business portfolio	16.7%	15.7%	16.0%	16.5%	16.6%	15.9%	15.2%	16.1%	15.5%	16.4%	16.7%

Source: MAPFRE Economics (with data from EIOPA)

or mutual fund and pension fund managers.

In terms of the evolution of the structure of the traditional business investment portfolio by asset type, of note is the 4.7 percentage point increase in investments in fixed income between 2010 and 2020, in addition to the 7.4 percentage point drop in equity investments. It should be noted that in the eurozone (and in all the insurance markets), fixed income investments continue to maintain a preeminent position, to the extent that the insurance business model entails the need to implement liability-driven investment strategies, in order to achieve an adequate match in terms of maturity and interest rates between the liabilities assumed and the investment instruments that support them.

Chart 2.1-c
Eurozone: disaggregated structure of investment portfolios in the traditional business by asset type, 2020
(%)



Source: MAPFRE Economics (with data from EIOPA)

In addition, as has been commented in previous versions of this report, in 2016 there was a break in the series in terms of the percentages of equities, which decreased with a correlative increase in the heading of "other investments," influenced by the entry into force of the Solvency II regulatory regime (2016) and the new capital risk weights associated with the different asset types, which inevitably led to a reallocation of investments, reducing the percentage of equities. However, it should also be noted that until 2016 the category of "other investments" was used in a very residual way, so that the variation may be partly due to accounting reclassification movements of portfolio investments. Furthermore, the drop in the percentage of real estate investments in 2016 was related to the new classification system under Solvency II, which excluded real estate for own use (see Table 2.1-b and Chart 2.1-b).

Finally, Chart 2.1-c illustrates the structural breakdown of the traditional business investment portfolio in the eurozone by asset type. The investments corresponding to mutual funds are presented by taking into account the placement of the investments carried out by these funds (the look-through approach). This information includes a breakdown of the fixed income investments, specifying that 31.2% of the total investment portfolio represented corporate fixed income investments, while 33.3% of the total took the form of sover-

Table 2.1-b
Eurozone: structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)

Asset type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed income	61.5%	61.7%	62.5%	62.9%	63.0%	62.6%	64.4%	67.8%	67.0%	66.3%	66.2%
Equities	22.9%	22.4%	22.2%	22.8%	22.8%	24.0%	17.9%	14.2%	14.9%	15.9%	15.5%
Loans	9.5%	9.3%	9.0%	8.4%	8.1%	7.6%	4.6%	4.9%	5.2%	5.0%	5.7%
Cash and deposits	3.5%	4.1%	3.7%	3.4%	3.7%	3.1%	2.8%	4.1%	4.0%	4.2%	4.2%
Real estate	2.5%	2.5%	2.5%	2.5%	2.4%	2.6%	1.9%	2.3%	2.4%	2.4%	2.4%
Other investments	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	8.4%	6.7%	6.6%	6.2%	6.0%

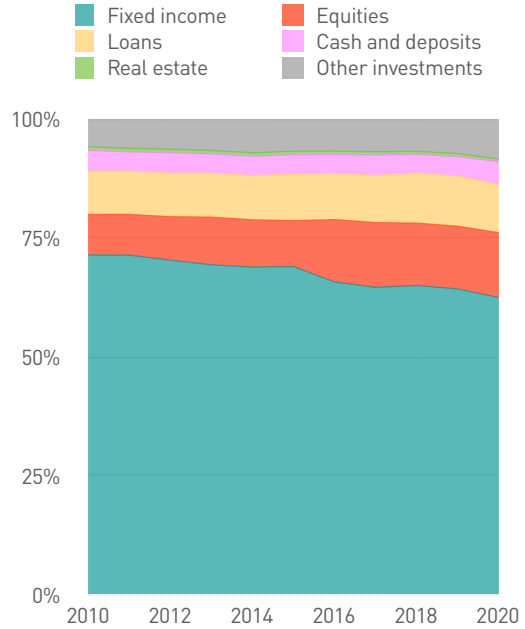
Source: MAPFRE Economics (with data from EIOPA)

eign fixed income investments (see Box 2.1 regarding the credit rating of the bond portfolio of European insurers).

2.2 United States

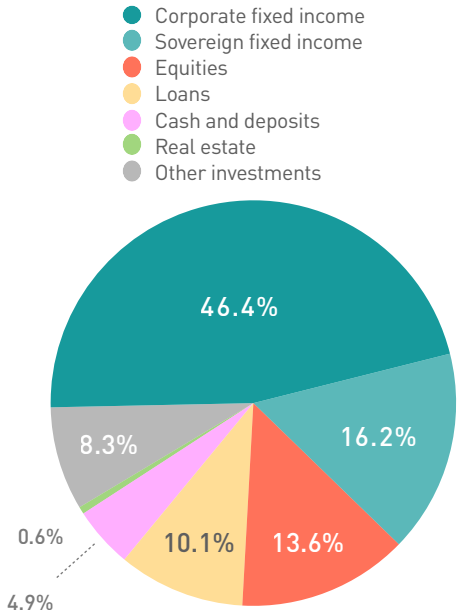
In terms of the US insurance market, the change in the structure of the traditional business investment portfolio by asset type between 2010 and 2020 is reflected in Table 2.2 and Chart 2.2-a. As can be seen in this information, unlike the trend seen in the eurozone insurance market, in the case of the US market, fixed income investments dropped by 8.9 percentage point between 2010 and 2020, with corporate fixed income securities bearing the brunt. Furthermore, as illustrated in Chart 2.2-b, using data from 2020, 46.4% of the total portfolio was in corporate fixed income investments,

Chart 2.2-a
United States: structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)



Source: MAPFRE Economics (with data from NAIC)

Chart 2.2-b
United States: structural breakdown of traditional business investment portfolios by asset type, 2020
(%)



Source: MAPFRE Economics (with data from NAIC)

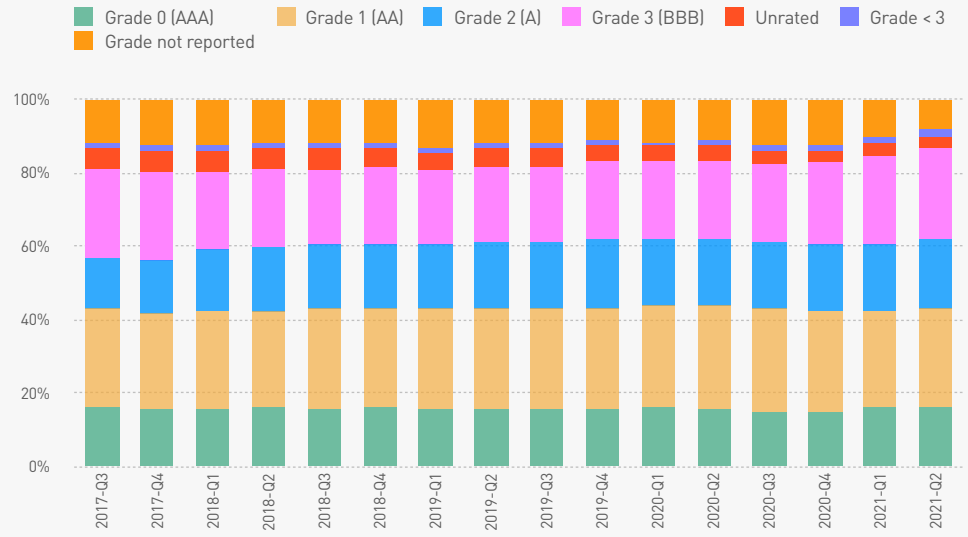
Box 2.1
The credit quality of European Union insurance companies investment portfolios

Credit quality of the investment portfolios

At the close of 2020, the fixed income bond portfolio held by insurance companies in the European Economic Area[1] accounted for around 65% of the total investment portfolio. From this total, 84.7% had an investment grade equivalent to a rating of BBB or higher (86.5% at the end of the first quarter of 2021). Most of these have a credit rating of 1, equivalent to AA, on a scale of 0 to 6, where 0 is the maximum rating, equivalent to AAA (see Chart A). At that time, bonds with a credit rating of 1 (equivalent to AA) accounted for approximately 27.3% of the total value of bond markets (26.4% at the end of the first half of 2021). Bonds with a credit rating of 3 (equivalent to BBB) accounted for approximately 22.3% of the total value of the market (24.6% at the end of the first half of 2021).

When analyzing the trend seen in recent years, it can be observed that bonds with a credit rating of 1 (equivalent to A) are the those that have increased their relative weight the most since 2017 (see Chart B). Bonds with a credit rating of 3 (equivalent to BBB) have experienced significant growth in recent years, increasing their weight by 3.1 percentage points between 2018 and the end of the first half of 2021, returning to similar levels as those seen at year-end 2017.[2] In its recent financial stability reports, the European Insurance and Occupational Pensions Authority (EIOPA) has warned that these bonds are subject to the risk of a reduction in their rating, which would take them beneath investment grade level and that a significant reduction in rating would have a major impact on the market value of the asset portfolio, while, at the same time, potentially increasing solvency capital requirements due to spread risk, which is considered a relevant risk.

Chart A
Credit quality of the bond portfolio
(%)



Source: MAPFRE Economics (with data from EIOPA)

1/ Made up of EU countries, plus Norway, Liechtenstein and Iceland
2/ EIOPA, *Financial Stability Report 2021* (including traditional portfolio and holder risk)

Box 2.1 (continued)
Credit quality of the investment portfolios of insurance companies in the European Union

Chart B
Heat map of the evolution of the credit quality of the bond portfolio
(%)

	Grade 0 (AAA)	Grade 1 (AA)	Grade 2 (A)	Grade 3 (BBB)	Unrated	Grade < 3	Grade not reported
2017-Q3	16.1%	26.9%	14.2%	23.9%	5.2%	1.9%	11.7%
2017-Q4	15.7%	25.9%	14.4%	24.0%	5.7%	1.7%	12.6%
2018-Q1	15.6%	26.7%	16.5%	21.5%	5.8%	1.6%	12.3%
2018-Q2	15.9%	26.8%	17.2%	20.7%	6.0%	1.6%	11.9%
2018-Q3	15.7%	27.1%	17.6%	20.5%	5.5%	1.6%	11.9%
2018-Q4	16.0%	27.2%	17.3%	20.9%	5.2%	1.4%	12.0%
2019-Q1	15.7%	27.3%	17.6%	19.9%	5.0%	1.4%	13.1%
2019-Q2	15.6%	27.3%	18.1%	20.7%	5.3%	1.2%	11.8%
2019-Q3	15.5%	27.4%	18.0%	20.9%	5.1%	1.2%	11.8%
2019-Q4	15.8%	27.5%	18.6%	20.8%	4.5%	1.4%	11.5%
2020-Q1	15.9%	28.1%	17.9%	21.0%	4.2%	1.2%	11.8%
2020-Q2	15.4%	28.2%	18.1%	21.2%	4.3%	1.3%	11.6%
2020-Q3	15.1%	27.8%	18.2%	21.4%	3.5%	1.4%	12.5%
2020-Q4	15.1%	27.3%	18.1%	22.3%	3.3%	1.4%	12.6%
2021-Q1	16.1%	26.1%	18.5%	24.0%	3.6%	1.6%	10.1%
2021-Q2	16.5%	26.4%	19.0%	24.6%	3.4%	1.6%	8.5%
2017-2021	0.4%	-0.5%	4.8%	0.7%	-1.8%	-0.3%	-3.2%

Source: MAPFRE Economics (with data from EIOPA)

Table 2.2
United States: structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)

Asset type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed income	71.5%	71.5%	70.5%	69.5%	69.0%	69.1%	65.9%	64.7%	65.1%	64.4%	62.6%
Equities	8.5%	8.6%	9.1%	10.0%	9.9%	9.6%	13.1%	13.6%	13.1%	13.2%	13.6%
Loans	9.1%	9.1%	9.2%	9.3%	9.3%	9.8%	9.7%	9.9%	10.6%	10.6%	10.1%
Cash and deposits	4.4%	4.0%	4.3%	4.0%	4.1%	4.1%	4.0%	4.3%	3.9%	4.1%	4.9%
Real estate	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.7%	0.6%	0.6%	0.6%
Other investments	5.7%	6.0%	6.2%	6.5%	7.0%	6.7%	6.6%	6.8%	6.7%	7.2%	8.3%

Source: MAPFRE Economics (with data from NAIC)

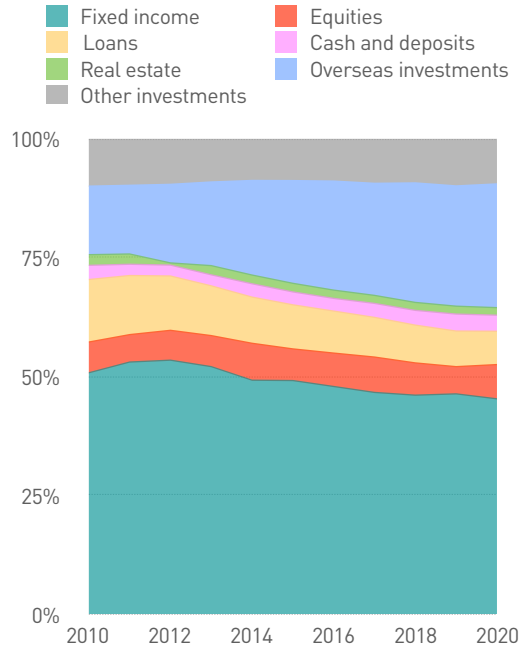
while sovereign fixed income investments represented 16.2% of the total portfolio. In turn, equity accounted for 13.6% of the total portfolio, and the fact that its weight increased by 5.1 percentage points during this period is worth noting.

2.3 Japan

The evolution of the investment portfolio structure in the Japanese insurance market between 2010 and 2020 is illustrated in Table 2.3 and Chart 2.3-a. An important feature of this market's investment portfolio is the high percentage of foreign investments held by insurance companies in the aggregate portfolio (26.0% at the end of 2020), which has also seen an increase of 11.6 percentage points over the decade. This represented a 132% increase on the volume of these investments in 2010.

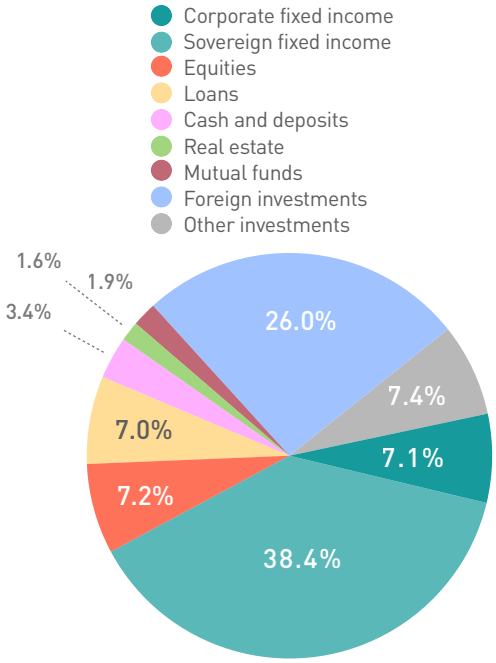
Furthermore, as can be seen in Chart 2.3-b, Japanese insurance companies are an

Chart 2.3-a
Japan: structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)



Source: MAPFRE Economics (with data from LIAJ and GIAJ)

Chart 2.3-b
Japan: structural breakdown of traditional business investment portfolios by asset type, 2020
(%)



Source: MAPFRE Economics (with data from LIAJ and GIAJ)

important source of investment for Japanese sovereign bonds and, in particular, for "super-long-term government bonds" (JGBs). However, the current low interest rate environment has made it very difficult to maintain the return on investment while aligning the duration of assets and liabilities, bearing in mind that old portfolios with high guaranteed rates still remain. The reaction from insurance companies in this environment has been to increase their investments overseas, mainly in US bonds, but also from the United Kingdom and emerging Asia, in search of higher yields to meet their guaranteed interest obligations. This has caused insurers to be more ex-

Table 2.3
Japan: structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)

Asset type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed income	51.0%	53.2%	53.6%	52.2%	49.4%	49.3%	48.1%	46.8%	46.2%	46.5%	45.5%
Equities	6.5%	5.8%	6.3%	6.5%	7.8%	6.7%	7.0%	7.4%	6.8%	5.7%	7.2%
Loans	13.1%	12.4%	11.4%	10.5%	9.7%	9.3%	8.8%	8.3%	7.9%	7.5%	7.0%
Cash and deposits	3.0%	2.4%	2.3%	2.3%	2.8%	2.7%	2.7%	2.9%	3.1%	3.6%	3.4%
Real estate	2.2%	2.2%	0.5%	1.9%	1.8%	1.8%	1.7%	1.7%	1.7%	1.7%	1.6%
Overseas investments	14.4%	14.4%	16.5%	17.6%	19.9%	21.6%	22.9%	23.6%	25.1%	25.3%	26.0%
Other investments	9.8%	9.6%	9.4%	8.9%	8.6%	8.6%	8.7%	9.2%	9.1%	9.8%	9.3%

Source: MAPFRE Economics (with data from LIAJ and GIAJ)

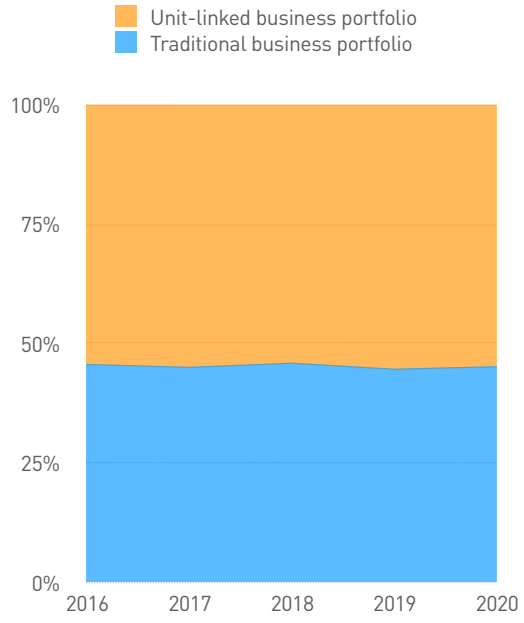
posed to international markets and to the risk of exchange rate fluctuations.

2.4 United Kingdom

Table 2.4-a and Chart 2.4-a reflect the evolution of the investment portfolio by insurance business type in the UK market (distinguishing between traditional business and the unit-linked business) between 2016 and 2020. In this case, given the United Kingdom's departure from the European Union, insurance companies operating in this market are no longer required to report to EIOPA, meaning that the data now must be obtained from the Bank of England (BoE).

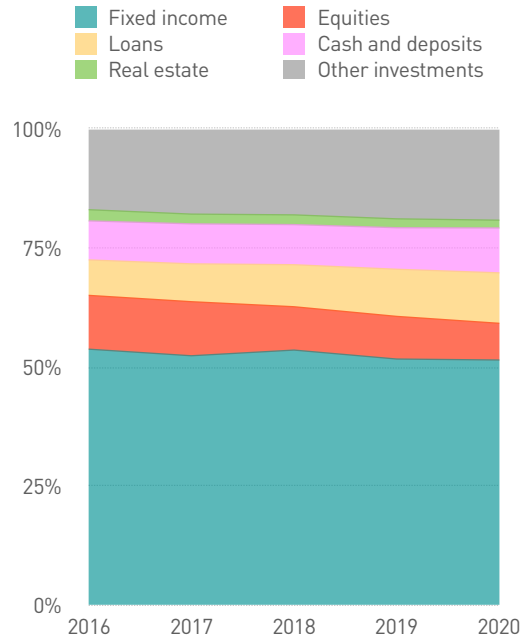
In contrast with the data for the combined eurozone markets, in the case of the United Kingdom, in the past there was a trend toward an increase in the proportion of the unit-linked investment portfolio compared to the traditional business portfolio, an idiosyncrasy of this market. However, in recent years, its weight in the total portfolio appears to have stabilized at around 55%, which still remains the highest share of the markets analyzed in this report.

Chart 2.4-a
United Kingdom: structure of investment portfolios by insurance business type, 2016-2020
(%)



Source: MAPFRE Economics (with data from BoE)

Chart 2.4-b
United Kingdom: structure of the traditional business investment portfolio broken down by asset type, 2016-2020
(%)



Source: MAPFRE Economics (with data from BoE)

Table 2.4-a
United Kingdom: structure of investment portfolios broken down by type of insurance business, 2016–2020
(%)

Type of business	2016	2017	2018	2019	2020
Traditional business portfolio	45.8%	45.1%	46.0%	44.8%	45.3%
Unit-linked business portfolio	54.2%	54.9%	54.0%	55.2%	54.7%

Source: MAPFRE Economics (with data from EIOPA)

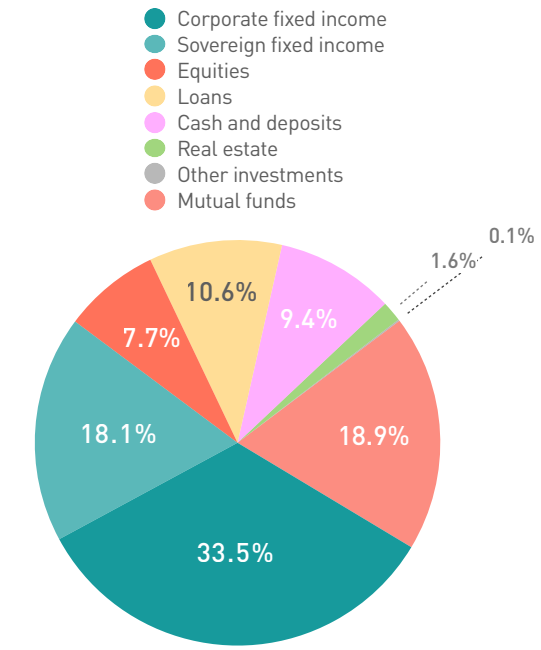
Table 2.4-b
United Kingdom: structure of the traditional business investment portfolio broken down by asset type, 2016-2020
(%)

Asset type	2016	2017	2018	2019	2020
Fixed income	53.9%	52.5%	53.7%	51.8%	51.6%
Equities	11.3%	11.4%	9.1%	9.0%	7.7%
Loans	7.5%	8.0%	8.8%	9.9%	10.6%
Cash and deposits	8.2%	8.4%	8.4%	8.7%	9.4%
Real estate	2.3%	2.0%	2.0%	1.9%	1.6%
Other investments	16.7%	17.6%	17.8%	18.6%	18.9%

Source: MAPFRE Economics (with data from BoE)

As regards the evolution of the structure of the traditional investment portfolio by asset type in the United Kingdom between 2016 and 2020, in the absence of details of the composition of mutual funds (look-through), it can be seen that the weight of fixed income bonds in the portfolio has stood at around 53% during the period. On the other hand, worth particular mention is the sustained increase over the past five years of the weight of loans, 3.1 percentage points in total (from 7.5% in 2016 to 10.6% in 2020), which represents an 80.2% increase in the volume of this type of investment compared to the start of the five-year period, Finally, it should be noted that, as with the eurozone, the entry into force of Solvency II led to the relocation of some investments, reducing the share of equities (see Table 2.4-b and Chart 2.4-b).

Chart 2.4-c
United Kingdom: disaggregated structure of the traditional business investment portfolio by asset type, 2020
(%)



Source: MAPFRE Economics (with data from BoE)

On the other hand, Chart 2.4-c illustrates the structural breakdown of the traditional business investment portfolio by asset type in the United Kingdom market in 2020. This information allows for the identification of the relative composition of fixed income investments, specifying that 33.5% of the total investment portfolio represented corporate fixed income investments, while 18.1% of the total portfolio took the form of sovereign fixed income investments. This structure contrasted with the predominant trend in the eurozone, and was closer to the behavior of the United States insurance market.

2.5 Spain

The Spanish insurance market continues to represent one of the smallest proportions of unit-linked investment portfolios in the eurozone and the smallest in the sample we have analyzed, with a total of 8.2% (7.4% in 2019). However, in 2020, they experi-

Table 2.5-a
Spain: structure of investment portfolios broken down by type of insurance business, 2010–2020
(%)

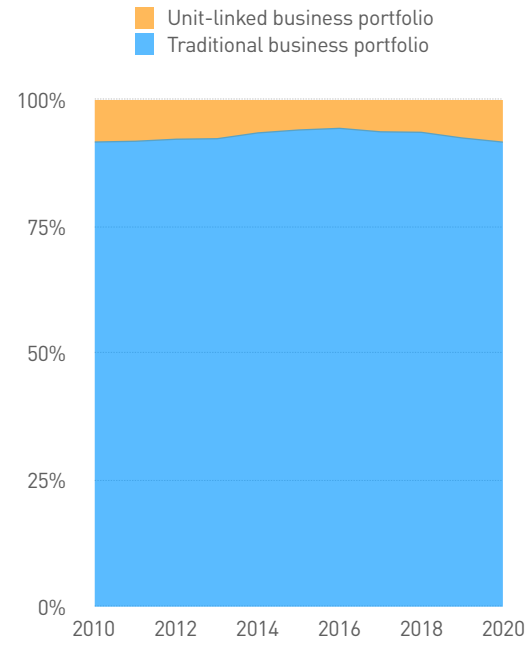
Type of business	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Traditional business portfolio	91.8%	92.0%	92.4%	92.5%	93.6%	94.2%	94.5%	93.8%	93.7%	92.6%	91.8%
Unit-linked business portfolio	8.2%	8.0%	7.6%	7.5%	6.4%	5.8%	5.5%	6.2%	6.3%	7.4%	8.2%

Source: MAPFRE Economics (with data from EIOPA)

enced a growth of 0.8 percentage points in terms of their weight compared to total investments and 13.0% compared to the volume of this type of investment year on year. The percentage of this type of investment is practically the same as it was at the beginning of the 2010–2020 decade, but it continues on the path of recovery that began in 2016; however, the percentage continues to be significantly below the eurozone average, where it represented 16.7% of total investments in 2020 (see Table 2.5-a and Chart 2.5-a).

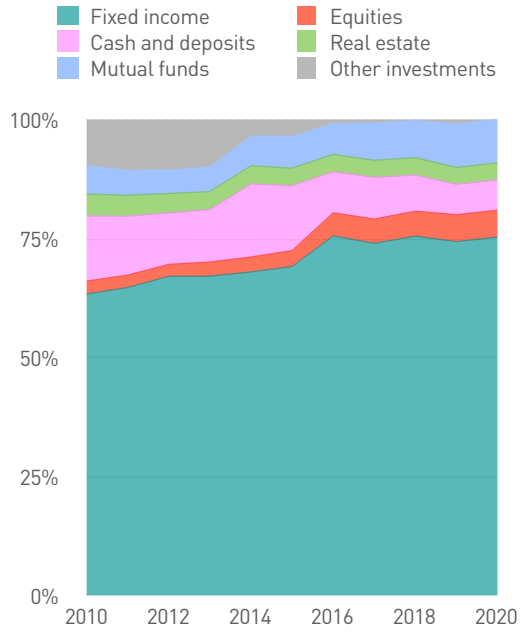
In terms of the changes shown in the structure of traditional business investment portfolios by asset type in Spain during 2010–2020, while fixed income investments accounted for 63.5% of the total in 2010, this percentage had risen to 75.5% (+12.0 percentage points) by 2020, at the same time that the amount of deposits and cash in that period decreased (-7.3 percentage points). This reassignment of the aggregate portfolio highlights the shift that was seen in 2016, when fixed income investments increased by 6.4 percentage points year on year, while investments in cash and deposits fell by 5.1 percentage points. This movement was influenced not only by the entry into force of Solvency II, but also by the monetary policy adopted by

Chart 2.5-a
Spain: structure of investment portfolios broken down by type of insurance business, 2010–2020
(%)



Source: MAPFRE Economics (with data from EIOPA)

Chart 2.5-b
Spain: structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)



Source: MAPFRE Economics (with data from ICEA)

Table 2.5-b
Spain: the structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)

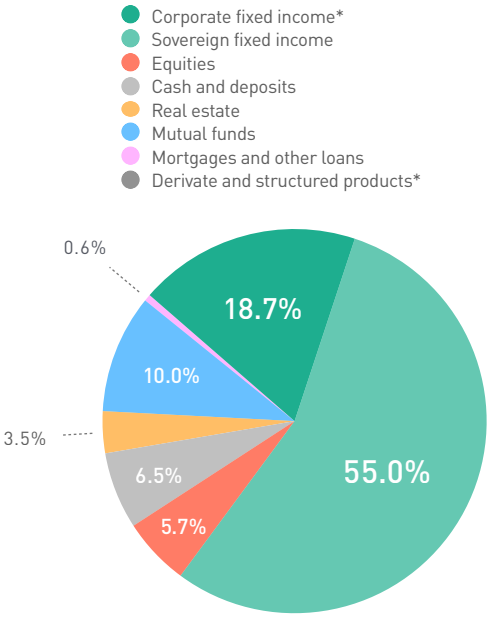
Asset type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed income	63.5%	64.9%	67.2%	67.2%	68.1%	69.3%	75.7%	74.1%	75.7%	74.5%	75.5%
Equities	2.7%	2.6%	2.5%	3.0%	3.1%	3.4%	4.8%	5.1%	5.2%	5.6%	5.6%
Cash and deposits	13.7%	12.4%	10.8%	11.1%	15.4%	13.7%	8.6%	8.8%	7.6%	6.4%	6.4%
Real estate	4.6%	4.4%	4.1%	3.8%	3.8%	3.7%	3.7%	3.6%	3.6%	3.5%	3.5%
Mutual funds	6.0%	5.2%	4.9%	5.1%	6.2%	6.7%	6.5%	7.8%	7.8%	9.1%	9.1%
Other investments	9.5%	10.6%	10.5%	9.8%	3.3%	3.4%	0.7%	0.6%	0.1%	0.8%	-0.2%

Source: MAPFRE Economics (with data from ICEA)

the European Central Bank, which reduced the deposit facility to -40 basis points in that year (-50 basis points at present). This sharply penalized cash holdings by economic agents (see Table 2.5-b and Chart 2.5-b).

Finally, the breakdown of investments for 2020 illustrated in Chart 2.5-c (applying the transparency or "look through" approach to investments through mutual funds, with information from EIOPA), shows the predominance of sovereign fixed income, which represented 55.0% of the total investment portfolio, while corporate fixed income accounted for 18.7% of total investments. Thus, the high percentage of investments in sovereign bonds in Spain, as well as the lower percentage of investments in equities compared to the eurozone average, must be noted.

Chart 2.5-c
Spain: disaggregated structure of the traditional business investment portfolio by asset type, 2020
(%)



Source: MAPFRE Economics (based on ICEA data)
* Net value after deducting the effect of the valuation on derivative and structured products (-1.14%).

2.6 Brazil

The Brazilian insurance market is characterized by a high percentage of investments managed through mutual funds. As illustrated in Table 2.6 and Chart 2.6-a, investments in mutual funds accounted for 88.1% of the portfolio in 2020, with an increase of 8.8 percentage points over the 2010–2020 period.

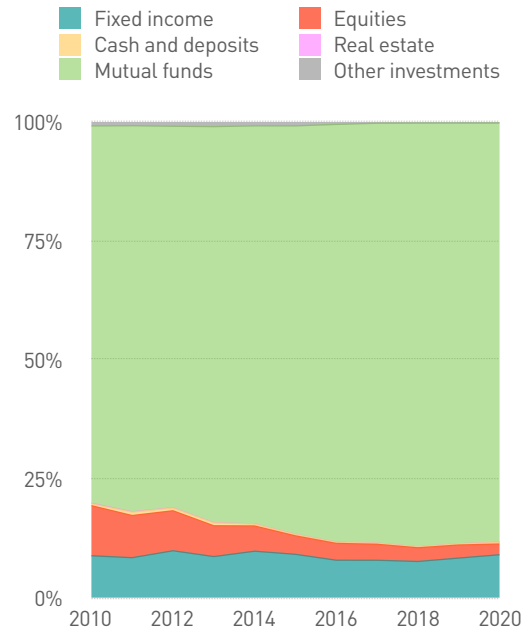
It should be noted that, according to information provided by the Superintendency of Private Insurance (SUSEP), the majority of assets invested through mutual funds are in fact fixed income securities, as is shown in Chart 2.6-b. Thus, based on 2020 data, the Brazilian insurance market's fixed income investments represented 90.9% of the total investment portfolio, while equities accounted for only 8.0%,[8] an increase in relative weight in the portfolio of 0.6 percentage points.

Table 2.6
Brazil: the structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)

Asset type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed income	9.0%	8.5%	10.0%	8.8%	9.9%	9.3%	8.0%	8.0%	7.8%	8.5%	9.2%
Equities	10.5%	8.9%	8.4%	6.5%	5.3%	3.9%	3.5%	3.4%	2.9%	2.7%	2.2%
Cash and deposits	0.4%	0.7%	0.6%	0.6%	0.4%	0.3%	0.2%	0.2%	0.2%	0.3%	0.3%
Real estate	0.1%	0.1%	0.1%	0.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Mutual funds	79.3%	81.2%	80.2%	83.3%	83.7%	85.9%	87.8%	88.3%	89.1%	88.4%	88.1%
Other investments	0.7%	0.6%	0.8%	0.8%	0.7%	0.7%	0.4%	0.1%	0.1%	0.1%	0.1%

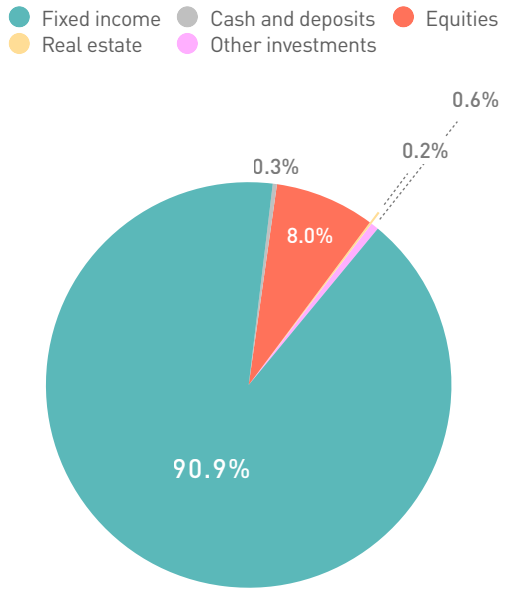
Source: MAPFRE Economics (with data from SUSEP)

Chart 2.6-a
Brazil: structure of traditional business investment portfolio broken down by asset type, 2010–2020
(%)



Source: MAPFRE Economics (with data from SUSEP)

Chart 2.6-b
Brazil: disaggregated structure of the traditional portfolio business investment portfolio by asset type, 2020
(%)



Source: MAPFRE Economics (with data from SUSEP)

2.7 Mexico

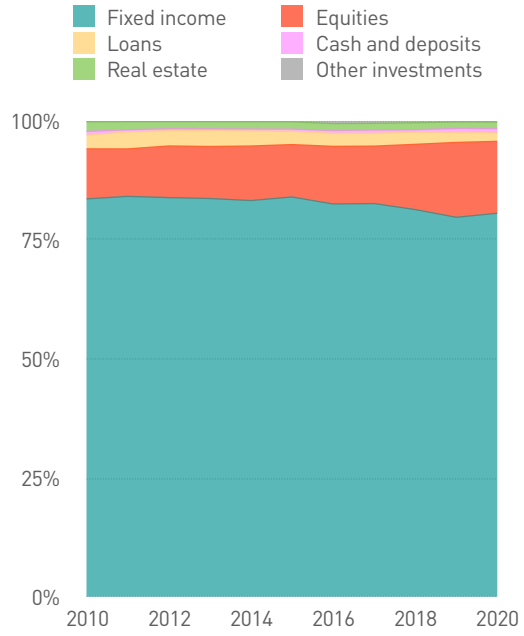
In the case of the Mexican insurance market, and based on information obtained from the National Commission for Insurance and Securities (CNSF), a strong predominance of fixed income investment is also observed within investment portfolios throughout the period 2010-2020 (see Table 2.7 and Charts 2.7-a and 2.7-b). During the same period, however, the proportion of fixed income investment dropped from 83.8% to 80.8% (a fall of 3.0 percentage points), while the proportion of variable income investment grew by 4.6 percentage points, rising from 10.5% in 2010 to 15.1%

Table 2.7
Mexico: structure of the traditional business investment portfolio broken down by asset type, 2010-2020
(%)

Asset type	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Fixed income	83.8%	84.3%	84.0%	83.9%	83.4%	84.2%	82.7%	82.8%	81.5%	79.9%	80.8%
Equities	10.5%	10.0%	10.9%	10.9%	11.5%	11.0%	12.1%	12.1%	13.7%	15.7%	15.1%
Loans	2.9%	3.6%	3.2%	3.3%	3.2%	2.8%	2.7%	2.7%	2.5%	2.1%	1.8%
Cash and deposits	0.8%	0.5%	0.4%	0.4%	0.4%	0.4%	0.6%	0.7%	0.5%	0.8%	0.9%
Real estate	2.0%	1.7%	1.5%	1.5%	1.5%	1.5%	1.5%	1.4%	1.5%	1.4%	1.4%
Other investments	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.4%	0.3%	0.2%	0.1%	0.1%

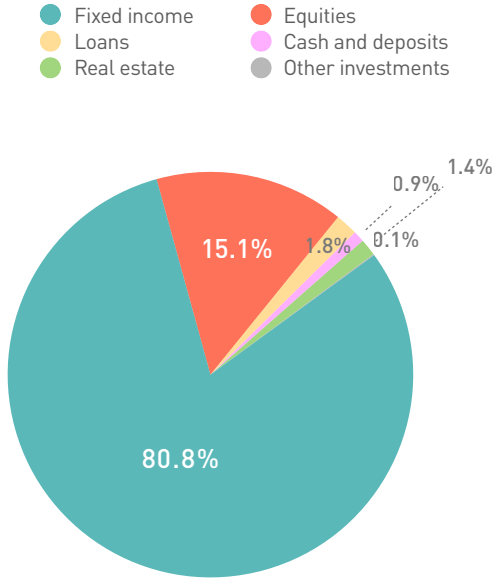
Source: MAPFRE Economics (with data from CNSF)

Chart 2.7-a
Mexico: structure of traditional business investment portfolio broken down by asset type, 2010–2020
(%)



Source: MAPFRE Economics (with data from CNSF)

Chart 2.7-b
Mexico: disaggregated structure of the traditional business investment portfolio by asset type, 2020
(%)



Source: MAPFRE Economics (with data from CNSF)

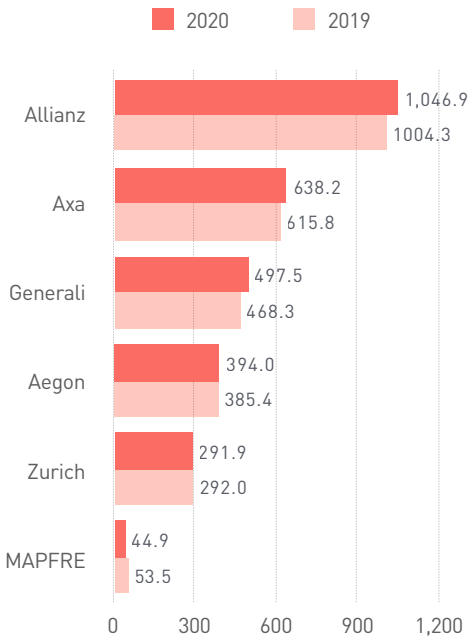
in 2020. Furthermore, the weight of equities in 2020 fell by 0.6 percentage points year on year, although in absolute terms, investments in this type of asset increased by 8.1%.

3. Investment portfolio structure of large European insurance groups

In order to complement the analysis of the distribution of insurance company investments, a concise analysis of the investment portfolios of some of the most important European insurance groups (defined as their parent company being located in this territory) which can be considered global groups is shown below. These are internationally active groups with a high volume of cross-border business. The groups selected had sufficiently homogeneous information available to make a comparison of their investment portfolios (including the ordinary portfolio, loans granted, cash and the investments allocated to unit-linked products). Thus, the information analyzed in Chart 3-a shows that the three largest European groups in terms of these analysis criteria are Allianz, Axa and Generali.

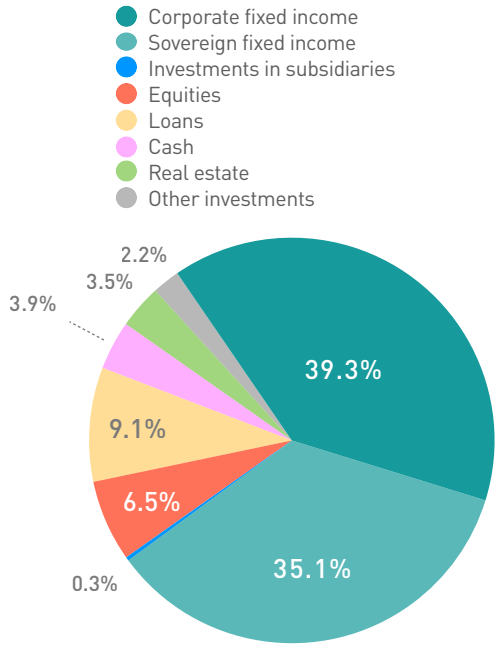
The aggregate analysis of the traditional business investment portfolios of these insurance groups (excluding unit-linked business) highlights the predominance of corporate fixed income, which represents 39.3% of investments, although in 2020 it experienced a slight reduction of 0.2 percentage points compared to the previous year. Sovereign fixed income at the close of 2020 represented 35.1% of the portfolio, seeing its proportion increase by 0.17 percentage points compared to its level at the close of the previous year (see Charts 3-b and 3-c).

Chart 3-a
Selected insurance groups: aggregated investment portfolio, 2019-2020
(billions of euros)



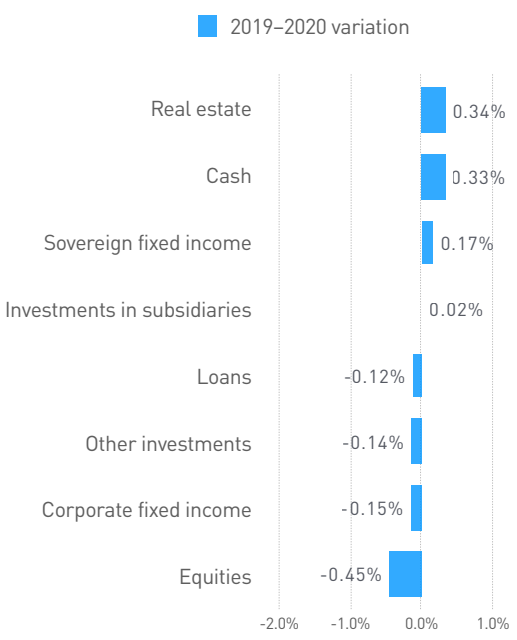
Source: MAPFRE Economics (with data from the consolidated financial statements of the aforementioned insurance groups)

Chart 3-b
Selected insurance groups: distribution by type asset of the aggregated investment portfolio, 2020
(%)



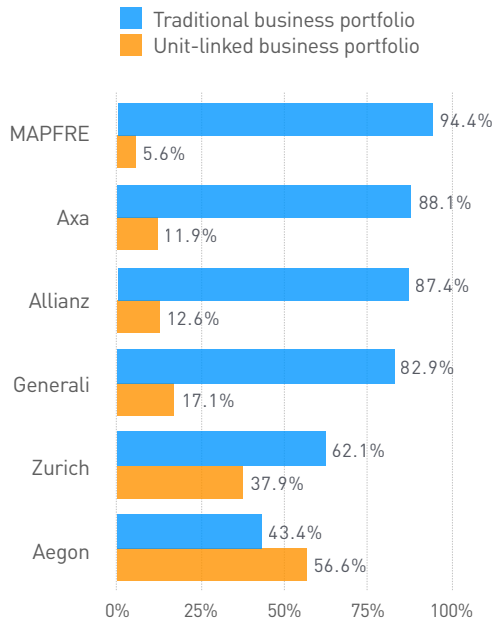
Source: MAPFRE Economics (with data from the consolidated financial statements of the aforementioned insurance groups)

Chart 3-c
Selected insurance groups: variation by aggregate investment portfolio asset type, 2019–2020
(%)



Source: MAPFRE Economics (with data from the consolidated financial statements of the aforementioned insurance groups)

Chart 3-d
Selected insurance groups: distribution by investment portfolio asset type, 2020
(%)



Source: MAPFRE Economics (with data from the consolidated financial statements of the aforementioned insurance groups)

In addition, Table 3-a and Chart 3-d show the distribution of the investment portfolios between traditional business and business in which the policyholder assumes the investment risk (i.e. unit-linked and similar) for all the insurance groups included in the sample analyzed.

In this regard, the case of Aegon stands out, in which the portfolio of the unit-linked and similar business has a majority percentage, which is influenced by its life business in the United States, a market in which variable annuity products predominate. In the case of the other insurance groups, portfolios linked to traditional business prevail.

Furthermore, Table 3-b shows the relative proportion at the close of 2020 of the different categories of assets for each of the insurance groups analyzed, and their comparison with the previous year. Finally, Table 3-c

Table 3-a
Selected insurance groups: weight of investments by type of business, 2019–2020
(%)

Type of business	Allianz		Axa		Generali		Aegon		Zurich		MAPFRE	
	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019
Traditional business portfolio	87.4%	86.8%	88.1%	88.2%	82.9%	83.2%	43.4%	41.3%	62.1%	61.5%	94.4%	95.3%
Unit-linked business portfolio	12.6%	13.2%	11.9%	11.8%	17.1%	16.8%	56.6%	58.7%	37.9%	38.5%	5.6%	4.7%

Source: MAPFRE Economics (with data from the consolidated financial statements of the aforementioned insurance groups)

Table 3-b
Selected insurance groups: distribution by type of assets of the investment portfolio, 2019-2020
(%)

Asset type	Allianz		Axa		Generali		Aegon		Zurich		MAPFRE	
	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019	2020	2019
Corporate fixed income	46.3%	46.5%	33.4%	34.1%	34.5%	35.9%	41.2%	37.4%	36.2%	37.7%	19.2%	18.3%
Sovereign fixed income	28.3%	27.3%	41.1%	42.6%	47.0%	45.2%	16.5%	17.2%	36.8%	35.6%	55.2%	59.0%
Equities	8.6%	9.0%	5.4%	5.6%	5.9%	7.0%	2.5%	2.9%	8.8%	9.1%	6.4%	5.4%
Loans	12.7%	12.9%	3.7%	3.7%	3.4%	3.3%	26.5%	28.5%	6.5%	7.1%	0.0%	0.0%
Cash	2.3%	2.4%	5.0%	4.0%	4.0%	3.6%	7.1%	7.7%	5.0%	3.9%	5.7%	5.0%
Real estate	1.4%	1.5%	5.9%	4.3%	4.2%	4.1%	1.4%	1.8%	6.7%	6.6%	5.3%	4.8%
Other investments	0.4%	0.4%	5.5%	5.7%	1.0%	0.9%	4.8%	5.9%	0.0%	0.0%	8.3%	7.5%

Source: MAPFRE Economics (with data from the consolidated financial statements of the aforementioned insurance groups)

summarizes the credit profiles of the investment portfolios broken down into the highest level of detail shown in the consolidated financial statements of the insurance groups analyzed, while Table 3-d presents the changes in the credit profile of the portfolios' investments.

In general terms, more than 50% of the investments are within the first three credit rating levels (in the range between 0 and 2, i.e. between AAA and A or equivalent).

Table 3-c
Selected insurance groups: investment portfolio credit profile, 2020
(%)

Credit rating	Allianz		Axa	Generali		Aegon		Zurich	MAPFRE
	Sovereign	Corporate	Total	Sovereign	Corporate	Sovereign	Corporate	Total	Total
Grade 0 (AAA or equivalent)	19.1%	18.7%	20.0%	4.9%	7.5%	72.9%	11.7%	22.5%	15.0%
Grade 1 (AA or equivalent)	43.1%	13.8%	32.0%	31.9%	9.3%	18.5%	7.6%	26.1%	10.8%
Grade 2 (A or equivalent)	16.8%	23.5%	21.0%	22.1%	25.3%	3.5%	37.7%	15.5%	48.5%
Grade 3 (BBB or equivalent)	16.3%	35.0%	22.0%	39.9%	50.3%	3.8%	36.9%	31.9%	22.3%
Grade < 3	4.1%	4.2%	1.0%	0.6%	6.7%	1.3%	5.6%	3.6%	1.2%
No credit rating (non-rated)	0.6%	4.8%	4.0%	0.6%	0.9%	0.0%	0.5%	0.4%	2.2%

Source: MAPFRE Economics (with data from the consolidated financial statements of the aforementioned insurance groups)

Table 3-d
Selected insurance groups: changes in the lending profile of the investment portfolio credit profile, 2019-2020
(%)

Credit rating	Allianz		Axa	Generali		Aegon		Zurich	MAPFRE
	Sovereign	Corporate	Total	Sovereign	Corporate	Sovereign	Corporate	Total	Total
Grade 0 (AAA or equivalent)	-0.4%	-0.6%	0.0%	0.1%	-0.8%	-1.8%	-6.1%	-1.9%	1.3%
Grade 1 (AA or equivalent)	-0.9%	0.5%	1.0%	0.6%	-1.2%	-0.2%	0.1%	1.0%	2.1%
Grade 2 (A or equivalent)	1.3%	-2.4%	-1.0%	1.8%	-1.2%	2.4%	0.9%	0.0%	-4.6%
Grade 3 (BBB or equivalent)	0.6%	1.2%	0.0%	-3.0%	2.0%	-0.3%	2.2%	1.5%	0.9%
Grade < 3	-0.3%	1.5%	-1.0%	0.0%	0.9%	-0.1%	-0.4%	0.0%	0.1%
No credit rating (non-rated)	-0.3%	-0.3%	1.0%	0.5%	0.3%	0.0%	-0.5%	-0.6%	0.2%

Source: MAPFRE Economics (with data from the consolidated financial statements of the aforementioned insurance groups)

4. Capital risk weights for investments applicable in the European Union

Below, as a general reference for analysis, is a comparison of the different gross regulatory capital risk weights. These are applicable to the most representative categories within the insurance companies' investment portfolios for insurers that apply the Solvency II standard formula, which have some influence on the composition of insurance group investment portfolios in this region of the world. They are based on the regulations in force and some may be subject to review in the upcoming reform of the Solvency II directive, the draft version of which is currently being negotiated by the European Commission, the Council and the European Parliament.

4.1 Investment in fixed income bonds

Investments in fixed income bonds have specific capital risk weights arising from differential risk (spread) and concentration risk. Weights for spread and concentration risks depend on: (i) type of asset; (ii) their credit risk rating; (iii) the residual maturity of the bond weighted by the amount of future flows (modified duration); and (iv) concentration with the same counterparty. Furthermore, additional capital risk weights may be decided in the event of deficient management of the risk of bundling of cash flows and/or currency provisions between assets and liabilities.

Capital risk weights by spread risk

Table 4 shows a comparative study of the gross capital risk weights applicable to different bond types per year of duration. To calculate the total gross risk weight for a specific bond, its modified duration

Table 4
Gross capital risk weights applicable to bonds per year of duration
(%)

Credit rating**	EEA sovereign bond*	Non-EEA sovereign bond	Corporate bond	Admissible infrastructures	Mortgage bonds	Preferred STS securitizations	Non-STS securitizations
Grade 0 (AAA or equivalent)	0.00%	0.00%	0.90%	0.64%	0.70%	1.00%	12.50%
Grade 1 (AA or equivalent)	0.00%	0.00%	1.10%	0.78%	0.90%	1.20%	13.40%
Grade 2 (A or equivalent)	0.00%	1.10%	1.40%	1.00%	1.40%	1.60%	16.60%
Grade 3 (BBB or equivalent)	0.00%	1.40%	2.50%	1.67%	2.50%	2.80%	19.70%
Grade 4 (BB or equivalent)	0.00%	2.50%	4.50%	4.50%	4.50%	5.60%	82.00%
Grade 5 (B or equivalent)	0.00%	4.50%	7.50%	7.50%	7.50%	9.40%	100.00%
Grade 6 (less than B or equivalent)	0.00%	4.50%	7.50%	7.50%	7.50%	9.40%	100.00%

Source: MAPFRE Economic Research (based on Delegated Regulation (EU) 2015/35)
* European Economic Area (EEA)
** See link to EIOPA's table of equivalence of credit ratings from EIOPA (see reference 4 of this report)

(weighted by the amount of flows) must be multiplied by the percentages appearing in Table 4. For durations higher than five years, the percentages applicable to the excess duration are somewhat lower, with the objective of not penalizing long-term investment excessively.[9]

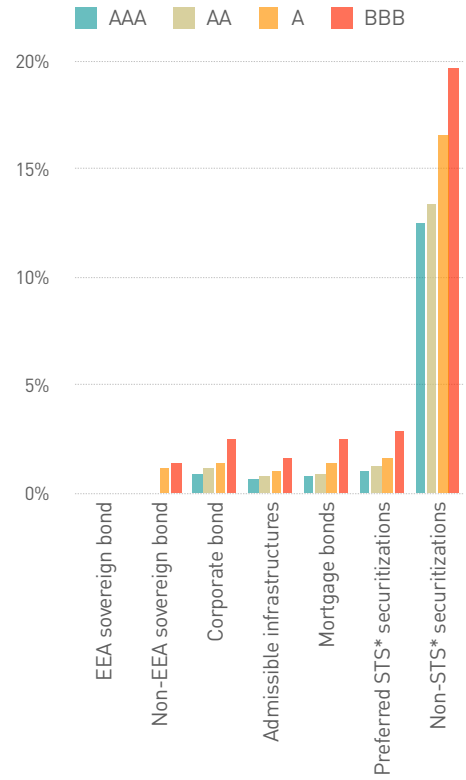
In turn, Chart 4 illustrates the behavior of capital risk weights, comparing the gross risk weights per year of duration for bonds situated in the investment grade range. It can be seen that investments in sovereign bonds from countries in the European Economic Area (EEA) do not have capital risk weights for spread risk, provided that they are denominated and financed in their own currency. Nevertheless, if currencies and durations are not correctly managed, this could give rise to a capital risk weight as a result of fluctuations in risk-free interest rates and/or exchange rates, in the event of the unbundling of cash flows and/or currency provisions between assets and liabilities. In addition, an increase in market spreads would affect eligible own funds to cover capital requirements, in the event of a fall in the market value of the sovereign bonds concerned. If sovereign debt investments from countries other than Member States with a credit rating of AAA or AA (or equivalent[10]) are involved, they do not have a differential capital risk weight either. For lower credit ratings, the capital risk weight will depend on the rating and the modified duration of the bond concerned.

As an example, a sovereign debt bond from countries other than EU Member States with a credit rating of A and a duration of five years would have a gross capital risk weight of 5.5%. If its duration is ten years, the capital risk weight is 8.4% and if the bond had a rating of BBB, the weights would be 7% and 10.5%, respectively. Bonds with no rating have specific capital risk weights that fluctuate in a range somewhere between the risk weights applicable to BBB and BB ordinary corporate bonds. It is important to point out that these percentages are applied both to direct investments and to investments implemented through mutual funds, to which the so-called "look-through" approach is applied.

Capital risk weights by concentration risk

Furthermore, if there is concentrated risk with a specific counterparty over and above a specific threshold, an additional capital risk weight is applied. In general, insurance companies do not usually exceed such thresholds, which are normally above those specified in their risk management policies and within limit control parameters. Nevertheless, the capital risk weights arising from non-compliance strongly pen-

Chart 4
Capital risk weights per year of duration: investment-grade bonds
(%)



Source: MAPFRE Economics (with data from EIOPA)

* Simple, transparent and standardized (STS) securitizations

alize concentration risk. As an example of the above, an investment in an AA bond belonging to a counterparty whose exposure exceeds 3% of the company's total assets would have an additional risk weight of 12% above the excess exposure. If a BBB bond is involved, the capital surcharge would be 27% above excess exposure greater than 1.5% above the company's total assets. However, investments in sovereign bonds from countries in the EEA do not have capital risk weights for concentration risk, provided that they are denominated and financed in their own currency.

4.2 Investment in shares

The gross capital risk weight applicable to investments in shares listed on regulated markets within Organization for Economic Cooperation and Development (OECD) countries is 39% of the value of the shares concerned. This risk weight must in its turn be adjusted by the "symmetrical adjustment," which has countercyclical effects within limits of between -10% and +10%. Nevertheless, a transitory system is still in place that allows lower capital risk weights to be applied until 2022, inclusive, increasing progressively by 2.5% until reaching 39% by 2023 (plus/minus the countercyclical adjustment).

For variable income instruments for investment in infrastructures which comply with the admissibility requirements for receiving preferential treatment, the gross capital risk weight is 30%, plus 77% of the symmetrical adjustment established for investment in shares. For non-listed shares, the capital risk weight is 49% plus the symmetrical adjustment. There are also special cases in which capital risk weights can end up being lower, as in the case of strategic holdings.

4.3 Capital risk weights for real estate investments

The gross capital weight for market risk for real estate investments is 25% of the value of the property. As in the case of other assets, this percentage is applied both to direct investments and to investments made through mutual funds, to which the so-called "look-through" approach is applied. There is an additional capital risk weight in the event of excess exposure in a single property. The excess threshold is 10% of the value of all the assets of the insurance company, excluding from this calculation certain assets such as those corresponding to life insurance contracts in which the policyholder fully assumes the investment risk (unit-linked). The additional capital risk weight would be 12% on the excess. Properties located in the same building are considered to be a single property.

4.4 Benefits of diversification and loss absorption capacity

Finally, it is important to point out that exposed capital risk weights are gross weights. The benefits of diversification, the loss-absorbing capacity of deferred taxes and the fact that investments may be assigned to portfolios of products with participation in discretionary profits mean that capital risk weight in terms of shareholders' equity requirements may be lower, depending on the risk profile of the insurance company concerned. The loss-absorbing capacity of deferred taxes may reduce the capital risk weight to a percentage equivalent to the corporate tax rate. Likewise, the loss-absorbing capacity of technical provisions will depend on the products that the company has in its portfolio with participation in discretionary profits.

References

1/ See: MAPFRE Economics (2020), *Elements for the Development of Life Insurance*, Madrid, Fundación MAPFRE.

2/ See: MAPFRE Economics (2022), *COVID-19: A Preliminary Analysis of Demographic and Insurance Industry Impacts*, Madrid, Fundación MAPFRE.

3/ See: MAPFRE Economic Research (2018), *Health Systems: A global analysis*, Madrid, Fundación MAPFRE.

4/ See: MAPFRE Economics (2022), *COVID-19: A Preliminary Analysis of Demographic and Insurance Industry Impacts*, cited above pp- 75-84.

5/ See: MAPFRE Economics (2020), *Elements for the Development of Life Insurance*, Madrid, Fundación MAPFRE, pp. 26-34.

6/ This means that savings are a proportion of the ratio between an individual's remaining time as an active person [*VRA*] and total remaining time [*VTA*], i.e.,:

$$S_t = (1 - \frac{VRA_t}{VRT_t}) * Y_t$$

Where:

S_t is savings,

Y_t is available income,

VRA_t is the active life that each individual has left at time t, which depends positively on the age of retirement, and

VR_t is the total remaining life of the same agent, which depends positively on life expectancy.

7/ See: https://www.mof.go.jp/english/policy/jgbs/publication/debt_management_report/2021/index.html
https://www.moodys.com/research/Moodys-Japanese-life-insurers-post-profits-for-more-than-20--PR_385153

8/ See Table 3.2.3-c of: MAPFRE Economics (2020), *The Latin American Insurance Market in 2020*, Madrid, Fundación MAPFRE.

9/ These reduced percentages can be found in Article 176 of Delegated Regulation (EU) 2015/35 (Solvency II).

10/ See the table of credit rating equivalences from EIOPA, at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02016R1800-20180515

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