

# Cross-Expertise

## ▶ RESEARCH

11 September 2024

## Spain: The Eurozone's new beating heart?

### A comparison between France and Spain

- ▶ **Macroeconomy:** the Spanish economy has staged a spectacular recovery since the COVID crisis, to the point where it is now the engine of growth in the Eurozone. The French economy is doing fairly well, but economic momentum seems to be running out of steam, against the backdrop of an unprecedented political instability and a challenging budget context.
- ▶ **Public finances:** since the end of 2021, Spain's public finance indicators have recovered much faster than in other EU Member States, particularly France.
- ▶ **Debt sustainability:** according to our simulations, the trajectory of Spain's debt will be more tightly controlled over the medium term than France's debt, with a median indicating a stability in France's compared with a fall of 11 percentage points of GDP for Spain's debt.
- ▶ **Spreads:** since 2017, of the four main Eurozone countries, Spain has seen its relative situation improve the most in terms of sovereign spreads against Germany. In contrast, the OAT spread has widened against Bund, in the context of a political crisis and budgetary risks.
- ▶ **Rates strategy:** appetite for Spanish sovereign bonds can be expected to hold up over the medium term and relative to the semi-core universe. However, (1) some weaknesses in Spain's debt structure persist and (2) Spanish public finances are more sensitive in the event of an economic downturn. These last two points could limit the potential for a tightening of Spanish spreads, particularly against OAT. Although most indicators suggest that Spanish bonds are expensive, we still have a constructive view on the Bono curve for the medium term compared with the French or Italian curves. We expect the 10-year Bono-Bund to tighten to around 75bp by the end of 2025.

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**Spanish economy  
outperforming...**

**... but the French  
economy is doing  
fairly well**

## Spain: the Eurozone's new engine of growth

### Spain has taken over as the engine of growth in the Eurozone

The Spanish economy has staged a spectacular recovery since the COVID crisis: after recording the biggest plunge of the four main Eurozone economies during the pandemic, the Spanish economy has rebounded strongly and is now the main engine of growth in the Eurozone.

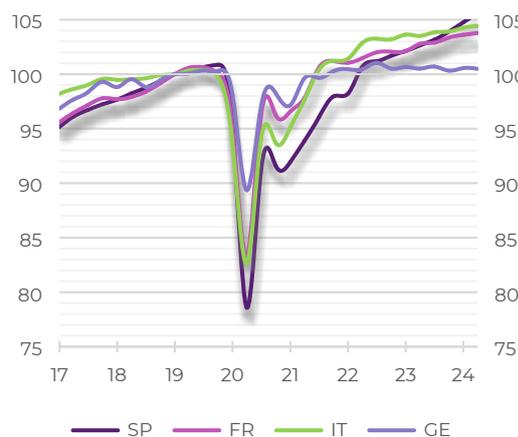
- ▶ With growth of 0.8% in Q2-24 (vs. 0.3% for the Eurozone and 0.2% for France), Spain is the country having recorded the strongest increase in GDP since 2019 (+6% vs. +4% for France – see **Chart 1**). The Spanish economy is being buoyed by a recovery in household consumption and investment, with dynamic exports, supported in particular by a pick-up of activity in the tourism sector.
- ▶ In France, the economy is doing fairly well, but seems to have lost momentum since the start of the year. Economic surveys indicate that activity is still buoyant in the services sector, but that manufacturing activity has deteriorated, with the exception of a few sectors such as transport equipment (Airbus notably). Political uncertainty combined with a very high general government deficit are also having a negative impact on the momentum of the French economy.

### Spain also has brighter medium-term prospects

Medium-term growth prospects also look more upbeat for Spain than for France according to growth potential estimates produced by various institutions (European Commission, OECD - see **Chart 2**).

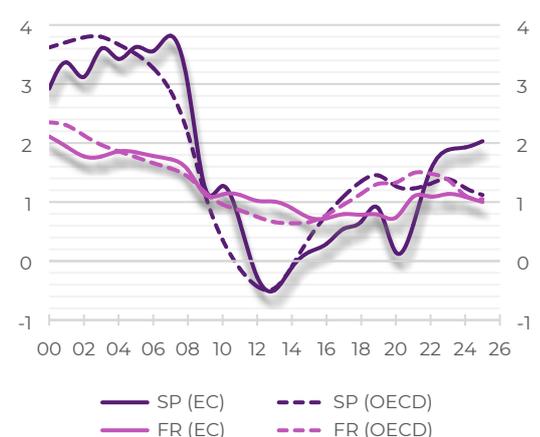
This is explained by stronger dynamics in the evolution of the Spanish workforce, against a backdrop of weakening labour productivity gains in both countries (see Spain: better understanding productivity trends).

**Chart 1: GDP growth (Q1-19 = 100)**



Sources: Refinitiv, Natixis

**Chart 2: Potential growth estimates (YoY, %)**



Sources: Ameco, OECD

## Political risk on both sides of the Pyrenees

### France: political instability looks set to last

After 51 days with no effective government, France has now a Prime minister, but still no government yet (See France: [Michel Barnier appointed as new Prime minister, a negotiator to break the political and fiscal deadlock](#)). However, this vacuum at the head of government, a record since 1946 and under the Fourth and Fifth Republics, is not that lengthy compared with the time taken by France's European neighbours to form a government (**Table 1**). In Spain, for example, it took four months in 2023 to form the current government (see?).

This absence of a functional government is the consequence of the snap general elections held on 29-30 June and 6-7 July 2024 that returned a highly fragmented Parliament with no clear majority (see Does France really need a Prime Minister?). The absence of a functional government poses a risk to the 2025 budget, in a particularly complicated context for France (European Council decision establishing the existence of an excessive deficit for France, under scrutiny of credit rating agencies, risk of further fiscal slippage this year).

Political instability could persist given the high risk of the next government being dismissed by a no-confidence vote, especially as the far right Rassemblement National emerged as kingmaker. Should a no-confidence vote succeed, new snap elections could be held next summer, with the risk of once again returning a hung Parliament.

### In Spain, threat posed by pro-independence parties hangs like a sword of Damocles

The vote of the 2025 budget could once again be 'polluted' by the political agenda of the Catalan pro-independence parties. Pedro Sanchez's government, formed in November 2023, quite a few months after the early elections held in July 2023, had already decided not to present a finance bill for 2024, after the Catalan regional chamber had been dissolved by its pro-independence president, a member of the Republican Left of Catalonia (Esquerra Republicana de Catalunya – ERC).

The central government feared that the budget vote would be seized upon by the two pro-independence parties during the campaign for the regional elections. The two parties also sat in the Congress of Deputies, and their support was essential for the government to secure a majority of the votes. Since then, in the last regional elections in Catalonia, the Socialists' Party of Catalonia (Partit dels Socialistes de Catalunya - PSC–PSOE) won the largest share of the votes but, being in a minority, it had to make a deal with ERC in return for approving a more favourable funding system in the draft 2025 budget. However, Junts (Junts per Catalunya), the other pro-independence party, which had hoped to head the Catalan executive, disapproved of this agreement, which barred its road to power. Junts, whose leader Carles Puigdemont is still the object of an arrest warrant upheld by Spain's Supreme Court, could reject the draft budget lock, stock and barrel, and join forces with the opposition People's Party (Partido Popular – PP) and far-right Vox party. Already in July, Junts prevented approval of the state spending ceiling, which is the preliminary stage in drawing up the budget.

**Political crisis as rarely seen before in France...**

**... whereas Spain is more accustomed to having to placate the demands of pro-independence parties**

The government therefore must negotiate constantly, not only with the Catalan pro-independence parties, but also with the other nationalist movements (Basque Country, Galicia) to pass laws (**Table 2**). Developments in Catalonia will therefore have to be watched closely. It is possible that the government will be forced to extend the 2023 budget to 2025, as it has already done for this year. This situation is far from unprecedented. Over the last ten years, different governments have extended the previous year's budgets on six occasions.

**Table 1: Months needed to form government**

Year formed	Country	Months needed to form government
2011	Belgium	18
2013	Italy	2
2018	Germany	6
2018	Italy	3
2020	Belgium	16
2021	Germany	2
2022	Netherlands	10
2023	Spain	4
2024	Netherlands	7
2024	Belgium	3 months (ongoing)
2024	France	2 months (ongoing)

**Table 2: Result of the general elections in Spain**

Party	Region	Bloc	MPs
Sumar	-	<b>Left</b>	31
PSOE	-		121
EH Bildu	Basque Country		6
EAJ/PNV	Basque Country		5
BNG	Galicia		1
ERC	Catalonia		7
Junts	Catalonia		<b>Indecisive</b>
CC	Canary Islands	<b>Right</b>	1
UPN	Navarra		1
<b>PP</b>	-		<b>172</b>
Vox	-		33
<b>Total</b>			<b>350</b>

Source: Natixis CIB

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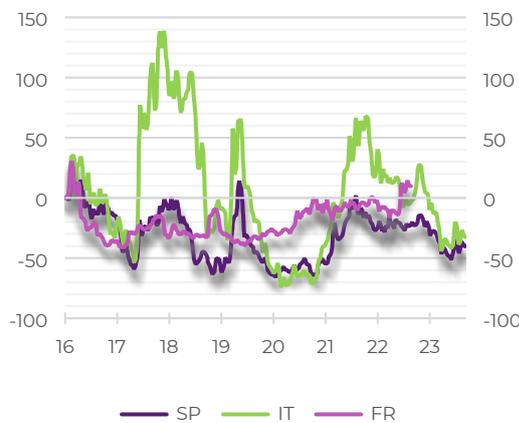
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## In the Eurozone class, is Spain now a better pupil than France when it comes to public finances?

Since 2017, of the four leading Eurozone countries, it is Spain that has seen its relative situation improve the most in terms of sovereign spreads against Germany (**Chart 3**). The 10-year Bono-Bund spread has tightened by around 40bp since the start of 2017, compared with just 23bp for Italy. By contrast, over the same period, the 10-year OAT-Bund spread has widened by around 10bp compared with its level at the start of 2017. Spanish rates are converging towards French rates, starting from a less favourable position (**Chart 4**) and ending up very close to each other.

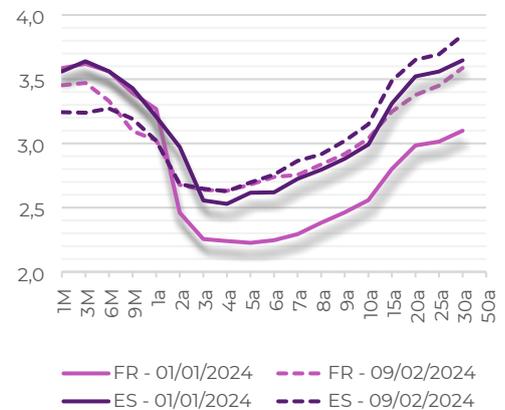
### France vs. Spain: tight match

**Chart 3: Cumulative change in 10-year sovereign spreads since January 2017**



Sources: Refinitiv, Natixis

**Chart 4: Yield curves**



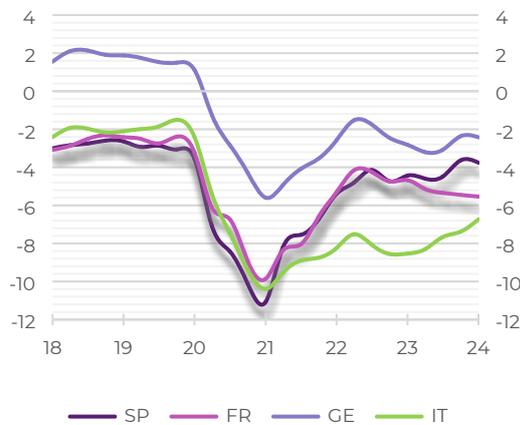
Sources: Refinitiv, Natixis

Beyond changes in market conditions having affected all countries in the same way, it is important to identify changes in macroeconomic fundamentals that could explain the tightening of the Bono-OAT spread in the recent period.

### Taking stock of the situation: a global shock with differentiated effects

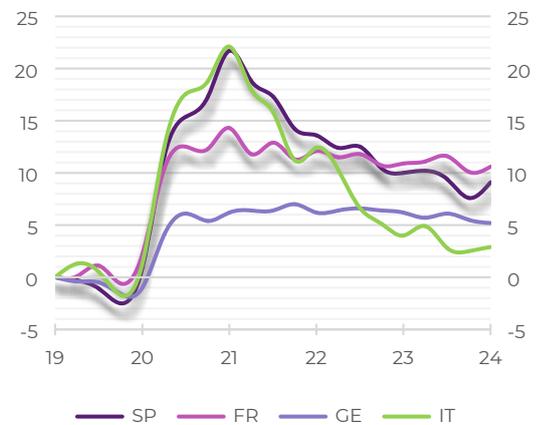
Like the majority of Eurozone countries, Spain's public finances deteriorated as a result of the COVID pandemic from Q1-20 onwards. Spain experienced a more catastrophic deterioration in its public finances. Public spending increased more significantly (**Chart 5**) and growth fell more sharply than in the other countries. As a result, the general government deficit deepened more in Spain than in its Eurozone neighbours. Ultimately, this led to a substantial increase in the public debt ratio: it rose by 21.7pp between Q1-19 and Q1-21 in Spain, by slightly less than in Italy (+22.1pp) but by much more than in France (+14.5pp) and Germany (+6.2pp).

**Chart 5: General government surplus/deficit (% GDP)**



Sources: Refinitiv, Natixis

**Chart 6: Change in public debt ratio since Q1-19 (% GDP)**



Sources: Refinitiv, Natixis

**Short term favourable to Spain**

Since the end of 2021 Spain's public finance indicators have recovered much faster than in the other Eurozone countries, particularly France and Italy. More specifically, public debt and general government balance are continuing to improve relative to GDP, whereas they are no longer improving in France. In the case of France, the general government deficit, after decreasing to 4.1% in Q2-21, started to deteriorate once more until the end of 2023, reaching 5.4% of GDP. In Spain, by contrast, the general government deficit fell by 0.5pp over the same period, from 4.1% in Q2-22 to 3.6% in Q4-23 (Chart 7). As regards the public debt, the trend is also clearly in favour of Spain (Chart 8), the public debt ratio having fallen steadily, whereas in France this ratio has stagnated at around 97.1% of GDP on average since the start of 2022.

**What factors might, over the long term, lead to a consolidation of Spain's situation?**

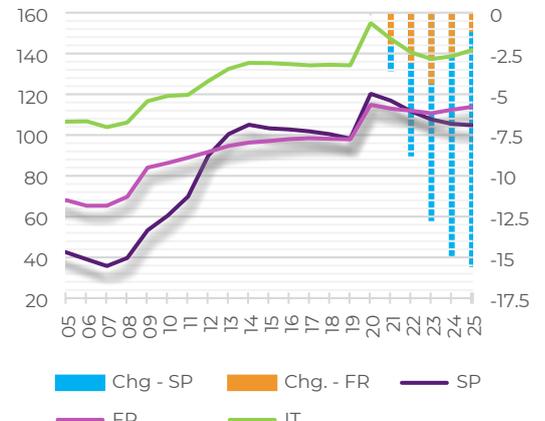
Spain has seen more of a fiscal consolidation, as measured by the change in the structural primary balance (fiscal balance excluding interest on the debt and corrected for cyclical effects), than France, and this is still the case. France's primary structural balance has been in deficit for quite some time and is likely to remain so over the next two years, whereas it is close to equilibrium in Spain. This trend explains, among other things, why the European Commission has not placed Spain under the excessive deficit procedure (EDP), unlike Italy and France, even though its general government deficit exceeds 3% of GDP and its public debt exceeds 60% of GDP.

**Chart 7: Primary structural balance (% GDP)**



Sources: European Commission forecasts, Natixis

**Chart 8: Public debt and change in public debt ratio of France and Spain between 2020 and 2025 (% GDP)**



Sources: European Commission forecasts, Natixis

Spain's gross public debt is also on a downward trajectory (**Chart 10**). It has fallen from 120.3% of GDP at its peak in 2020 to 107.7% at the end of 2023, and is expected to decrease to 104.8% at the end of 2025 according to the European Commission's forecasts. Meanwhile, France's gross public debt peaked at 114.9% of GDP in 2020 before falling to 110.6% at the end of 2023. However, according to the European Commission, this ratio could go back on the rise and reach 113.8% by the end of 2025. This is yet another reason for the European Commission to open an excessive deficit procedure against France.

**Spain: undoubtedly high-quality debt, but less shock-resistant**

In sum, Spain was more severely affected by the health crisis, but growth dynamics have since rebounded strongly and turned out to be stronger than in the case of France. In the medium term, the growth outlook also looks more robust, suggesting that the solvency of Spain's public debt will not be called into question in the medium term. In our view, the risk would appear to stem from the Spanish economy's greater sensitivity to cyclical fluctuations, owing to a higher sensitivity to shocks (as seen during the health crisis and the 2008 great financial crisis). In this respect, Spanish debt probably remains a little fragile compared with French debt.

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## Analysis of Spanish debt sustainability

The annual change in the debt-to-GDP ratio can be represented by a function that depends on four main factors: (1) real growth; (2) the GDP deflator; (3) the primary balance; and (4) the average interest rate paid on the debt (for more details on the underlying mechanics, see equations 1 and 2 in the appendix). By estimating and projecting these different factors, it is possible to construct scenarios in which a debt trajectory specific to each scenario is determined.

This section looks at the trajectory of Spanish debt with a similar methodology to the one used in reports published earlier this year that analysed the sustainability of France's debt<sup>1</sup> and Italy's debt<sup>2</sup>. This methodology is based on the analysis of debt under two types of scenarios: (1) deterministic scenarios in which the assumptions about the parameters are fully known and set by us; and (2) stochastic scenarios in which the addition of an uncertainty term influences the results by giving them a probabilistic nature. In the latter case, we use a Bootstrap method, details of which are given in the appendix. These two types of scenarios are complementary: the first allows the construction of new scenarios by not being bound by past observations and correlations, while the second makes it possible to incorporate interdependencies that cannot be fully integrated in the first case.

In the case of our deterministic scenarios there are five different paths: a baseline scenario with growth based on the OECD's long-term projection assumptions and inflation close to the ECB's official target; a second based on an optimistic growth projection assumption, set 0.5pp a year higher than in our baseline scenario; and a scenario with a growth assumption 0.5pp a year lower than in our baseline scenario. In variations of the last two scenarios, a negative growth shock and an inflationary shock have been integrated, respectively, occurring in the first two years of our simulation; variables then gradually reverting to the central scenario assumptions. It should be noted that, for each scenario, the primary balance projection is the same and is based on the European Commission's forecasts<sup>3</sup>. Details of all these values and the respective debt trajectories are summarised in **charts 9 and 10**.

**Chart 9: Spain: Average value of key variables between 2025 and 2033 and change in debt-to-GDP ratio**

	GDP real growth	GDP deflator	Nominal interest rate	Primary deficit	Change in debt to GDP ratio (pp)
Sc0: Natixis Baseline	1.4%	2.1%	2.3%	-1.2%	-2%
Sc1: Opportunistic	1.8%	2.4%	2.6%	-1.2%	-8%
Sc2: Pessimistic	1.0%	2.1%	2.7%	-1.2%	3%
Sc3: Activity shock	0.5%	2.1%	2.3%	-1.2%	9%
Sc4: Inflationary shock	1.4%	2.7%	3.0%	-1.2%	-6%
Bootstrap 40%-60%	1.5% ; 2.7%	2% ; 3.3%	1.3% ; 3.2%	-1.8% ; - 0.5%	
Bootstrap 25%-75%	0.5% ; 3.7%	0.7% ; 4.5%	-0.4% ; 4.9%	-2.9% ; 0.7%	

Sources: Natixis

\* The shock is temporary and assumed to peter out over the next 2 years under ECB's action

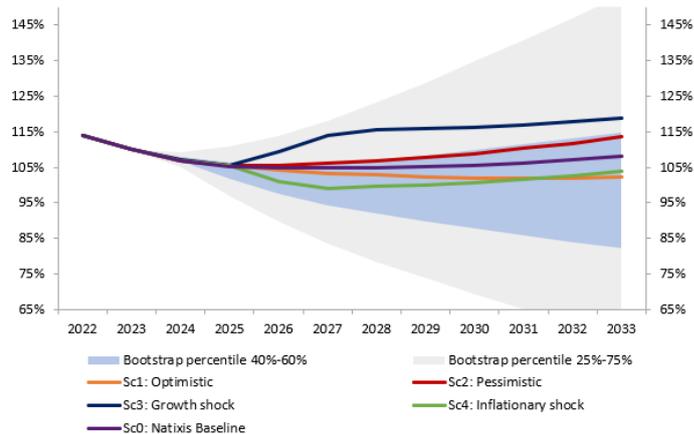
Source: Natixis

<sup>1</sup> [France: Public finances in seven questions](#)

<sup>2</sup> [Italy: Fiscal challenges in perspective](#)

<sup>3</sup> 2024 country report - Spain

**Chart 10: Change in debt-to-GDP ratio under different scenarios**



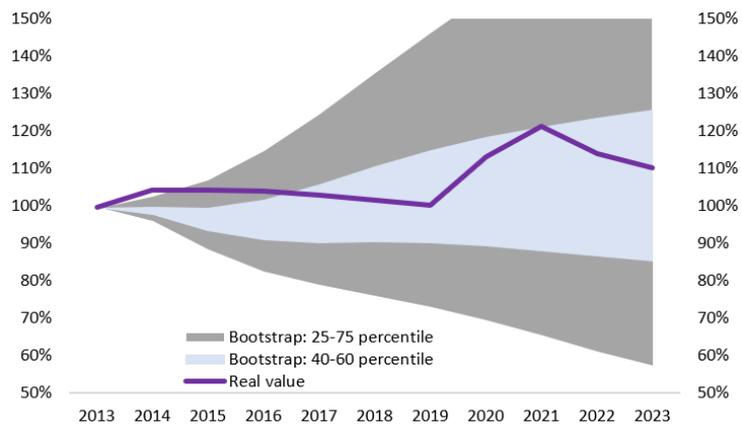
Sources: Natixis, OECD, European Commission

**Spain : none of our scenarios indicate an uncontrolled increase in medium-term debt**

Based on the assumptions for our deterministic scenarios, three of them show an improvement in the debt-to-GDP ratio, including our baseline scenario, with none of the scenarios pointing to an uncontrolled increase in debt over the medium term. These findings are supported by the stochastic simulations when focusing on the interval containing 20% of simulations around the median, this interval also having the advantage of offering an interval for future changes in the different variables that is credible in relation to reality.

It is, nonetheless, legitimate to question the relevance and accuracy of the results given by stochastic simulations. To address this, a backtest was performed by simulating the debt trajectory over the period 2014 to 2023 and comparing the results with current values (see charts 11 & 12).

**Chart 11: Backtest: changes in Spanish debt using stochastic simulations over the period 2014 to 2023**



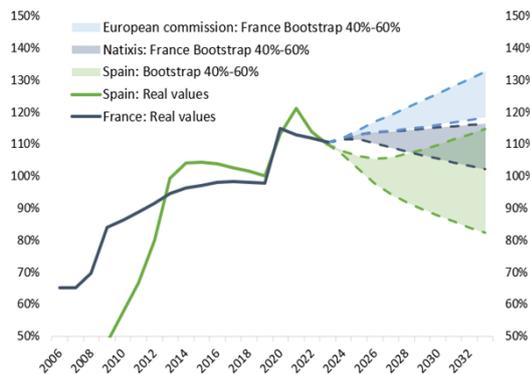
Source: Natixis, Refinitiv

This simulation was carried out under the same conditions as our projection for the period 2023 to 2033, with estimates of GDP, the GDP deflator, interest rate and primary balance obtained using a VAR model. The backtest therefore provides reasonable confidence about the reliability of the results of our simulation.

**France : the future trajectory of France's debt will largely depend on controlling the primary balance**

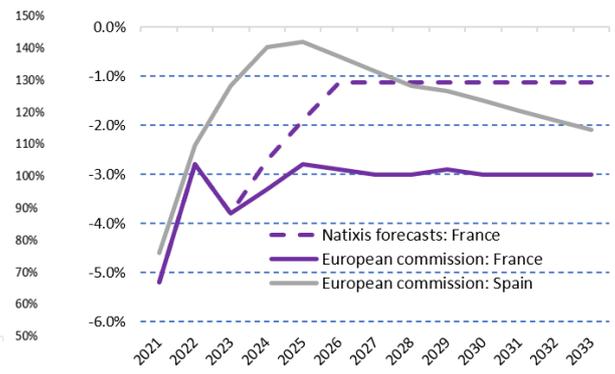
To put the results of the stochastic simulations obtained for Spain into perspective, we compare them with those obtained for France and presented in the report published earlier this year<sup>4</sup>. This time, however, we show two results (charts 12 & 13). The first integrates the primary balance projections necessary for France's general government deficit to remain below 3% of GDP from 2026 onwards, while the second incorporates the forecasts of the European Commission in its 2024 European Semester: Country Reports published in June and used for its debt sustainability analysis.

**Chart 12: Change in the debt-to-GDP ratio of France and Spain**



Sources: Natixis, European Commission

**Chart 13: Change in primary balance of France and Spain**



Sources: Natixis, European Commission

**The trajectory of Spain's debt will be more benign over the medium term than France's debt**

From this perspective, there are several points worth mentioning. First, the future trajectory of France's debt will largely depend on controlling the primary balance. Secondly, it seems that the trajectory of Spain's debt will be more tightly controlled over the medium term than France's debt, with a median indicating a stability in French debt (at -1%, taking into account our estimate of the change in the primary balance as opposed to the European Commission's forecast) compared with a fall of 11 percentage points of GDP for Spain's debt. Finally, although Spain's debt appears to be under control in the short and medium term, the management of its primary balance will be a determining factor for the debt's long-term trajectory, as highlighted by the European Commission in its 2024 Spain Country Report published in June.

Our simulations of the trajectory of Spain's debt all converge in the same direction. It seems that the probability of a decrease in debt over the medium term is greater than an increase, except in the case of a negative growth shock. However, it is important to stress that, as in the case of France, the management of the general government budget and future changes in interest charges will determine the trajectory of Spain's debt going forward.

<sup>4</sup> France: Public finances in seven questions

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## Outlook for Bono-Bund spread over the medium-term

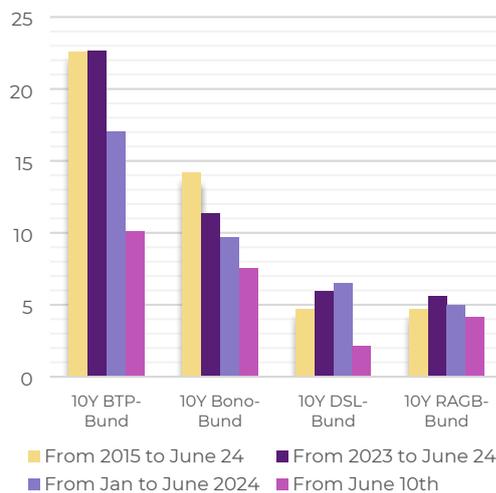
There has been very keen appetite for Spanish sovereign bonds this year, as shown by the evolution of the spread against the 10-year Bund, which is trading at around 80bp, 20bp below its average level since 2015. Since the announcement of the early general elections in France, the yield for the 10-year Bono has converged towards its French counterpart, the spread narrowing to +10bp, a level not seen since before 2008. This raises the question of the sustainability of such a tight spread against OAT, and of a potential improvement in credit quality over the medium term that would see Spanish bonds eventually trade below their French counterparts.

### Bono has gradually shifted from peripheral to semi-core

During periods denoted by a widening of sovereign spreads, Spain has become less and less sensitive to risk-off events, as shown in the chart below. The Bono curve was previously exposed to spread widening phases in the same way as BTPs. Currently, the curve's beta level is gradually converging towards the level of the Austrian RAGB (Chart 14). This trend was very much confirmed during the French political crisis of June-July 2024, when Spanish bonds outperformed their French counterparts.

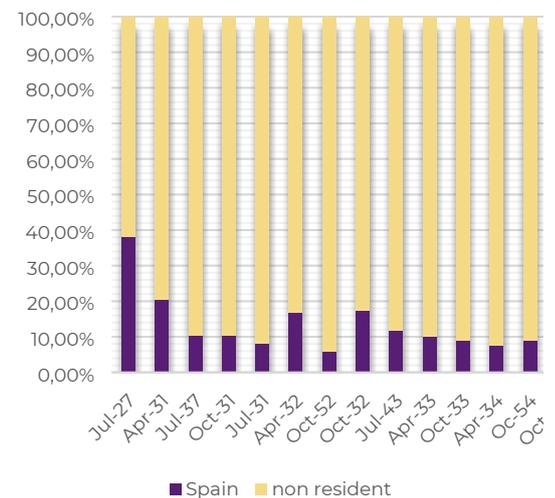
Spain's annual issuance programme has proceeded smoothly since the start of the year. The Spanish Treasury has completed more than 75% of its annual programme, i.e. around €135bn, with increasing appetite displayed by non-resident investors at the latest syndications. Their share of allocations has risen from 60% in 2020 to 90% this year (Chart 15). We do not expect the Treasury to stage further syndications before the end of the year.

**Chart 14: Exposure of spreads to a 10bp widening of the 10-year OAT-Bund spread (bp)**



Sources: Bloomberg, Natixis

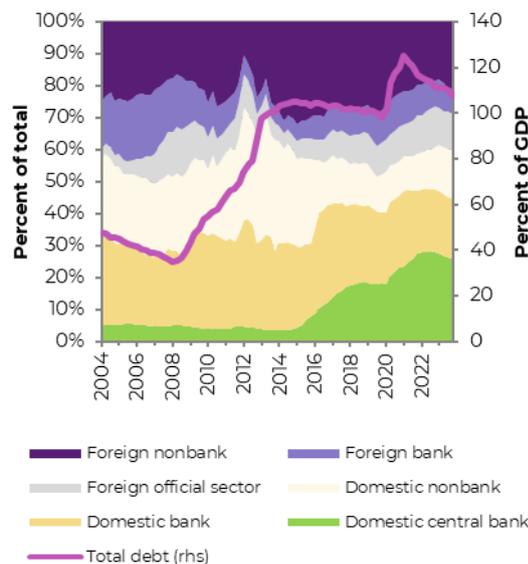
**Chart 15: Allocation of Spanish syndications between residents and non-residents (%)**



Sources: Spanish Treasury, Natixis

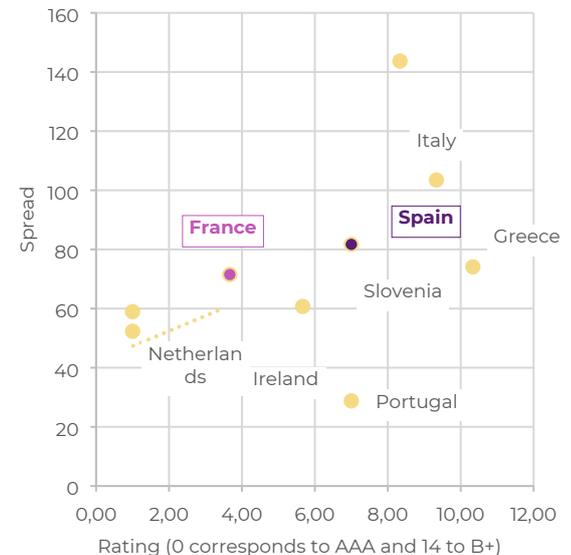
**The share of Spain's debt held by non-resident investors is between levels for France and Italy.** In 2023, non-resident investors held around 41% of total outstanding Spanish government debt (€1,574bn), a level that is still 9pp lower than for France, but 15pp higher than for Italy (**Chart 16**). In the case of non-residents, official accounts (such as central banks and sovereign wealth funds) held 12% of the debt and banks only 8%. Non-bank non-resident holdings amounted to 23%. With regards to residents, banks held 19% of Spain's public debt, while the Eurosystem held around 26%. Finally, non-bank residents (insurance companies and asset managers) held around one-eighth of Spain's debt.

**Chart 16: Ownership of Spain's debt (%)**



Sources: IMF, Natixis

**Chart 17: Average ratings (S&P, Fitch, Moody's) and spreads vs. 10-year Bund**



Sources: Bloomberg, Natixis

**Although Spain is the fourth largest sovereign bond issuer in the Eurozone, its debt remains less liquid than that of Germany, France or Italy.** According to data from the Bank of Spain, around €150bn worth of bonds are traded every month, representing around 10%-15% of bonds in circulation, while in Germany this represents around €550bn, or about 40% of bonds in circulation, and in France around €300bn-€350bn, or about 15%.

**Arguments for a structural tightening of Bono spread (against Bund and semi-cores):**

- ▶ **Dynamics point to a faster reduction in the general government deficit and public debt than other semi-core issuers such as France and Belgium.** This raises the question of a more favourable rating in the medium term. Spain is probably the country most likely to benefit from a positive rating action (Moody's, DBRS and Scope have raised their outlook to Positive over the past year), and this could be a supporting factor for a further improvement in Spanish credit (**Chart 17**), especially compared with other semi-cores (Belgium and France for example).
- ▶ **GDP growth dynamics have been more upbeat in recent years** than in the main Eurozone countries.

- ▶ **Lower sensitivity to a widening of sovereign spreads**, showing that Spain is less and less perceived as protection against risk-off. This point needs to be put into perspective, however, as Spanish futures are little traded on the market compared with France, Germany or Italy.
- ▶ **Spain had made greater progress in its issuance programme** than other Eurozone countries, which has a favourable bearing on the spread.

**Arguments against a structural tightening of Bono spread (against Bund and semi-cores):**

- ▶ **The Bono curve could be more exposed than the others to a normalisation of Japanese monetary policy and the unwinding of carry trades.** MoF does not publish data directly on flows of Spanish government bonds, but it does so for aggregate Spanish debt. Japan-based investors bought €41bn of Spanish bonds between 2012 and mid-2022. Since then, holdings have fallen by only €4bn, which means Spain could be more exposed than Italy to a further unwinding of carry trades as the BoJ goes about normalising its monetary policy.
- ▶ As mentioned above, **the lesser liquidity of Spanish debt relative to the debts of other major Eurozone countries** may affect its spread tightening potential by maintaining an illiquidity premium over French debt.

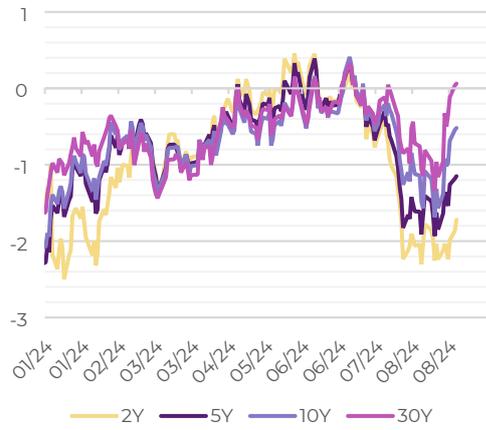
**What remaining potential for Bono vs. other semi-cores?**

**Although a great many indicators suggest that Spanish bonds are expensive, we still have a constructive view of the Bono curve over the medium term** compared with the French or Italian curves. We expect the 10-year Bono-Bund spread to tighten to around 75bp by the end of 2025 (with a widening in June 2025 assuming there is another dissolution of the French National Assembly), while we expect the 10-year BTP-Bund and OAT-Bund spreads to remain stable.

	12-month Z-scores							
	2Y	5Y	7Y	10Y	15Y	20Y	30Y	50Y
Bono Bund	-0.1	-0.8	-0.7	-0.8	-0.9	-0.9	-0.8	-0.7
Bono BTP	0.9	0.4	0.4	0.5	0.6	0.5	0.3	0.3
Bono OAT	-1.6	-1.5	-1.5	-1.6	-1.7	-1.6	-1.7	-1.9

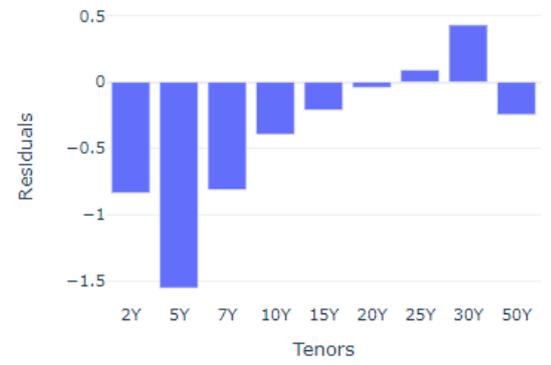
As for the Bono curve, our analysis (**Chart 18** and **Chart 19**), whether by calculating the Z-scores over 2024 for the different maturities or by applying a principal components analysis (PCA) to the curve, indicates that the 30-year point is cheaper than the other points on the curve, suggesting a potential, albeit limited gain for the taking.

**Chart 18: 9-month Z-scores for Bono curve**



Sources: Bloomberg, Natixis

**Chart 19: PCA of Bono curve**



Sources: Bloomberg, Natixis

## Appendix

### Debt accumulation equation

$$\Delta d_t = \frac{(i_t - g_t)}{1 + g_t} \times d_{t-1} - pb_t + dda_t \quad (1)$$

Where:

- ▶  $\Delta d_t$ : the annual change in the debt-to-GDP ratio
- ▶  $i_t$ : average interest rate paid each year, as estimated using the second equation below
- ▶  $g_t$ : nominal GDP growth, equal to the sum of real GDP growth and the GDP deflator
- ▶  $pb_t$ : primary balance
- ▶  $dda_t$ : deficit-debt adjustment, equal to zero in the present case

### Average interest rate on the debt

$$i_t = (1 - a) \times i_{t-1} + a \times m_t \quad (2)$$

Where:

- ▶  $m_t$ : the average borrowing rate for new debt incurred, approximated by the nominal 10-year BONO yield.
- ▶  $a$ : the percentage of new debt incurred relative to total debt. In the present case = 1/8.5, where 8.5 represents the average duration of Spanish negotiable debt.

### Stochastic scenarios

*We used data from 1991 to 2023 (1991 to 2013 in the case of the backtest) to estimate a VAR model of 10-year BONO yields, real GDP growth and GDP deflator growth. The covariance matrix of the estimated residuals was then used to generate 10,000 shock sequences (the so-called Bootstrap method) and to form an equivalent number of scenarios and debt trajectories. These 10,000 trajectories can then be ranked in ascending order, and from there we can extract a distribution containing various statistics such as the median and/or construct intervals around the median (25%-75% and 40%-60% in the case of our simulations).*

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