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SPAIN

SELECTED ISSUES

June 2025

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May 16, 2025

Approved By
European Department

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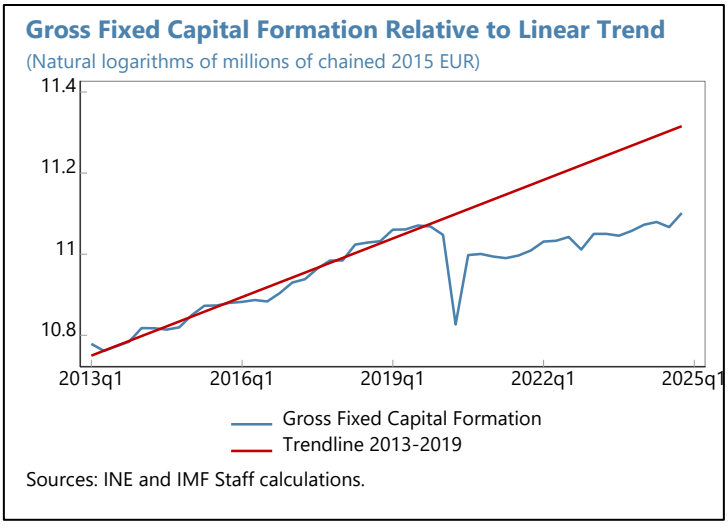
CONTENTS

POST-PANDEMIC INVESTMENT: ASSESSING THE SLUGGISH RECOVERY[1]

Five years after the pandemic, gross fixed capital formation has only recently returned to its pre-pandemic level despite the strong rebound in economic activity. The investment recovery has been weak across all components, but particularly so in transport equipment and other construction. Investment has been lagging euro area peers and has also remained below levels implied by its historical drivers, narrowing the gap with these fundamentals only in recent quarters. While Spain's investment shortfall remains to be fully explained, analysis in this paper finds that elevated economic policy uncertainty has been a drag. Compared to other large euro area economies, firm-level data also point to a weaker investment response to profitability among small firms—which make up a large share of the Spanish economy—and younger to middle-aged firms—which are key drivers of growth. This also hints at a potential role of uncertainty or other factors weighing on Spanish firms' willingness to invest, even when financial capacity is available. For younger and middle-aged firms specifically, financial constraints, as captured by high leverage, are also found to have been a constraint during the pandemic. Reducing domestic policy uncertainty, improving financing conditions for constrained firms, and addressing structural barriers to investment could help unlock a more sustained and broad-based investment recovery.

A. Background and Motivation

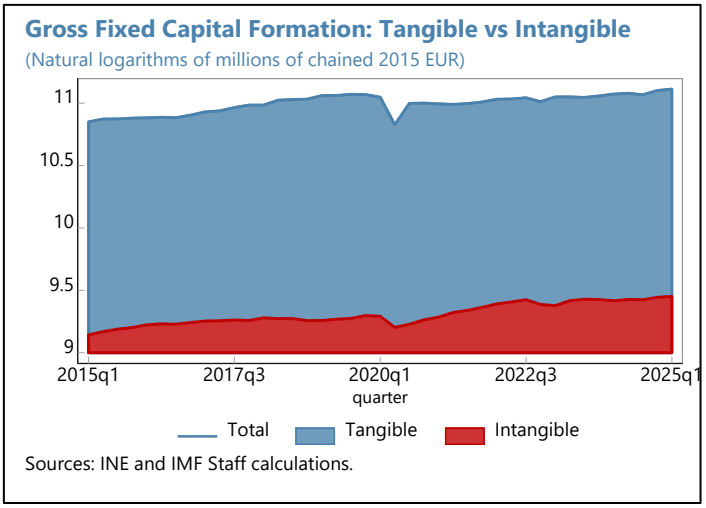
1. Investment in Spain has experienced a notably slow recovery since the COVID-19 pandemic. Nearly five years on, gross fixed capital formation (GFCF)—which captures the flow of new investment into fixed capital—has only just returned to its pre-pandemic level, despite strong real GDP growth and the implementation of EU Next Generation (NGEU) funds. Following a sharp decline in 2020, investment picked up only gradually, reaching its 2019 level by late 2024. However, it remains about 21 percent below the level implied by a simple pre-pandemic (2013-2019) linear trend.



[1] Prepared by Nina Biljanovska (EUR).

2. This shortfall in investment has been driven primarily by the weakness of tangible capital. In contrast, investment in intangible capital rebounded relatively quickly after its initial decline and has continued to grow, albeit at a more moderate pace since 2022. While the rising share of intangible capital may signal a structural shift toward knowledge-based investment, consistent with trends in other euro area economies, intangibles still account for a relatively small share of total capital formation, and their strength has not been sufficient to offset the persistent weakness in tangible investment.

3. The weak investment rebound raises several important questions for both Spain's future growth prospects and economic policy. Is the weakness broad-based or concentrated in specific sectors? How does Spain's investment performance compare to that of euro area peers such as Germany, France, and Italy? Has investment deviated significantly from levels implied by fundamentals? And to what extent have policy-related forces such as economic uncertainty and financing constraints played a role? Given that the investment shortfall has been concentrated in tangible capital—and that intangibles, while resilient, still represent a small share of total investment—the focus is on the post-pandemic dynamics of tangible investment.



4. To address these questions, the analysis combines macro- and micro-level data and econometric techniques. The analysis begins by presenting stylized facts on recent trends in capital formation across sectors in Spain and relative to euro area peers. It then estimates an error-correction model to assess how investment has evolved relative to historical fundamentals predicted by economic theory. The discussion then turns to cross-country firm-level data to delve further into the potential drivers of Spanish firms' weak investment, with a focus on firm characteristics—such as profitability, leverage, age, size, and competitiveness—and how these influence the investment behavior of specific types of firms such as smaller or younger ones. A key contribution of the analysis is the use of cross-country firm-level panel data to compare the determinants of investment in Spain with those in other euro area economies, and to explore whether these drivers may have changed since the pandemic.

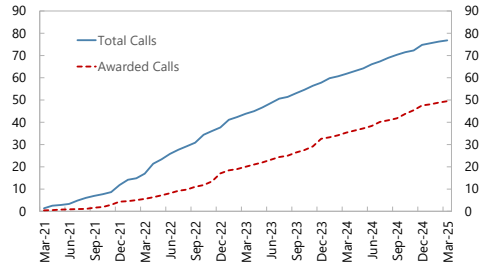
Box 1. Investment Component of the Recovery, Transformation and Resilience Plan[1]

1. Since 2021, Spain has received a large inflow of funds from the Recovery and Resilience Facility (RRF) to finance investments in its Recovery, Transformation and Resilience Plan (RTRP). The envelope of €163 billion—representing about 10 percent of GDP or over half of Spain's yearly aggregate investment—is split roughly evenly between the grant and loan components. So far, about 60 percent of the allocated RRF funds have been disbursed, and a fifth payment request—comprising grants and, for the first time, loans—is currently under evaluation by the European Commission.

2. The early stages of implementation of the plan focused on advancing reforms, and only recently has it shifted toward meeting investment targets. Almost 70 percent of the planned reforms have been completed, while only 12 percent of the investment milestones and targets have been fulfilled. This partly reflects the structure of the plan, which frontloaded reform efforts. All milestones and targets of the plan associated with the grant component have to be completed by August 2026.

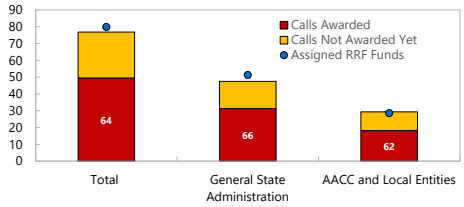
3. Execution of investment projects funded with RRF grants has advanced steadily and focusing on high-return projects should remain the priority, but some acceleration will be needed to meet the required deadlines. By end-March 2025, the amount called reached almost €77 billion (96 percent of total grants available), with about 65 percent of this amount (almost €50 billion) having already been awarded. While the remaining gap in execution is similar between the central government and the regional and local governments, there is great heterogeneity among the latter, with call award rates ranging between 40 and 75 percent. While accelerating execution will be needed, project selection—targeting productivity-enhancing and green projects—should remain the priority. Improving coordination across all government levels would help ensure an effective use of the funds.

RRF Funds: Amounts Called and Awarded to Final Private Sector Beneficiaries
(Billion Euros)



Sources: IMF staff calculations based on ELISA.

RRF Funds: Planned Allocation to Each Administration Level and Amounts Called/Awarded to Final Private Sector Beneficiaries
(Billion Euros, Up to March 2025)

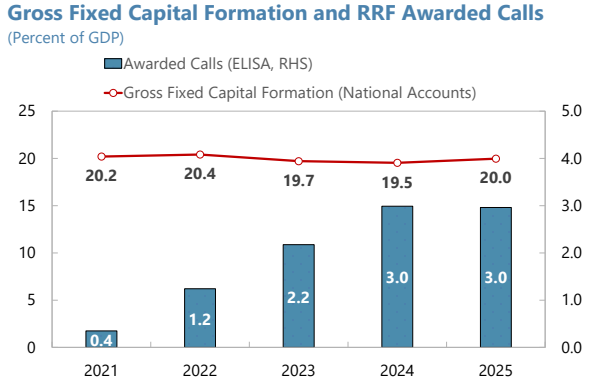


Sources: Recovery Plan Website, ELISA and IMF staff calculations.
Note: The numbers inside the red bars represent the share (in percent) of awarded calls in total calls. AACC = Autonomous Communities.

1/ Prepared by Ana Lariau (EUR)

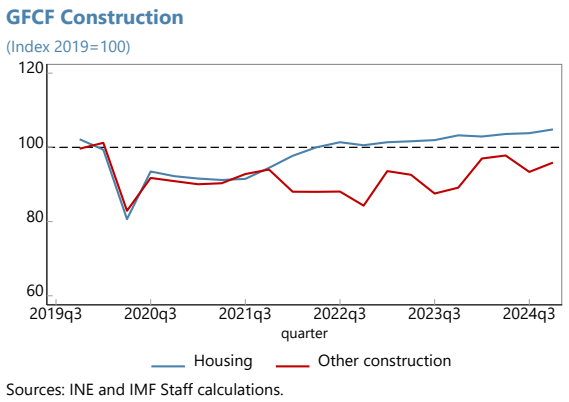
Box 1. Investment Component of the Recovery, Transformation and Resilience Plan (Concluded)

4. While the execution of RRF funds is progressing, it has yet to translate into materially higher aggregate investment, which has remained broadly stable as percentage of GDP. Changes in the amounts awarded per year (as percent of GDP) have not been matched by equivalent changes in the share of gross fixed capital formation in GDP in the National Accounts. There are several possible, non-mutually exclusive explanations for this. First, the backloading of investment milestones and targets might also imply a backloading of actual investment effects. Second, some of the RRF-funded investments may end up being classified as intermediate consumption rather than gross fixed capital formation in the National Accounts. Third, the multi-year nature of some of the projects may lead to a smoother investment execution profile, distributed over several years—such as in transportation, for example. Fourth, there could be delays between the approval of calls, the distribution of funds to firms, and the actual execution of the investments. Fifth, and finally, there could be other investment components in the National Accounts that may have declined since 2021, offsetting the positive impact of RRF-related investments. In other words, absent NGEU funding, the investment rate might have declined instead of remaining stable.

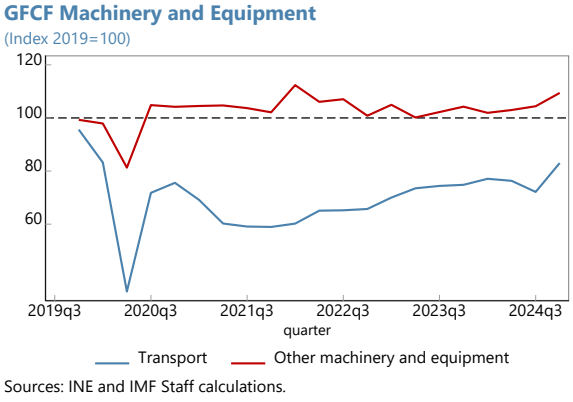


B. Recent Dynamics: Key Facts

5. The recovery of investment has been weak across all sub-components, though some have underperformed more than others. Investment in transport equipment has been the weakest, remaining nearly 20 percent below its pre-pandemic level by end-2024—also noted by the Bank of Spain (2025). This is followed by other construction (non-residential construction), which remains below its 2019 level. Housing investment and investment in other machinery and equipment have returned to around their pre-pandemic levels, but their rebound has also been modest and failed to keep pace with the broader recovery in output.

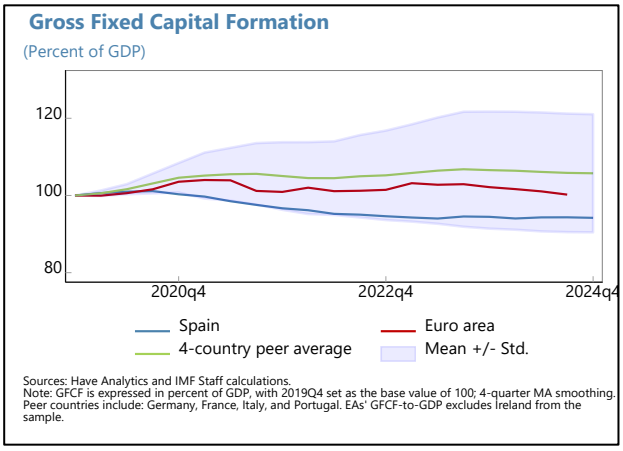


Sources: INE and IMF Staff calculations.



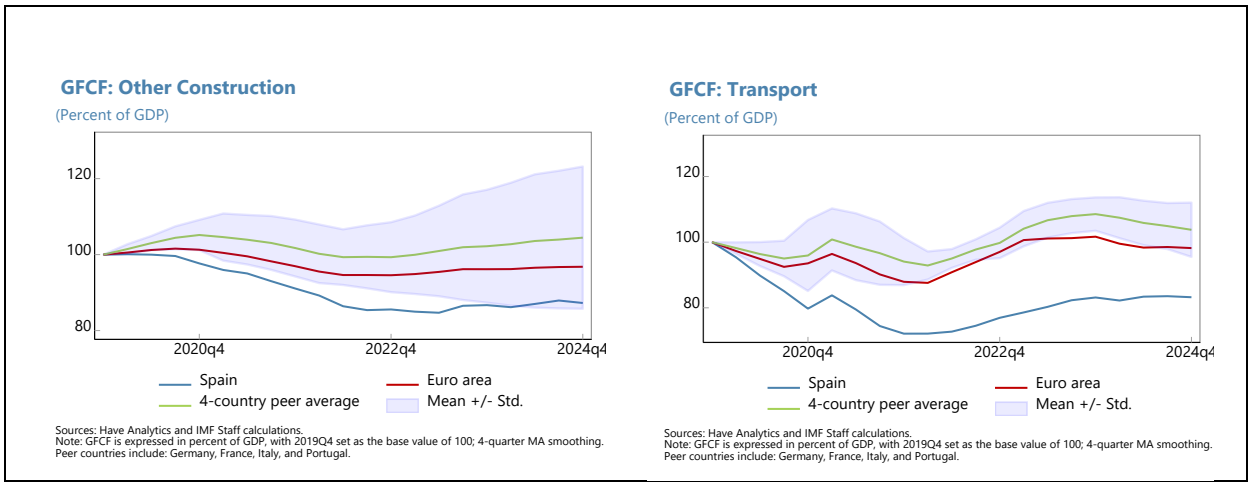
Sources: INE and IMF Staff calculations.

6. Spain's investment recovery has also been lagging that of European peers, which yet was also sluggish. This is clear from a simple comparison of changes in investment ratios since the pandemic. While the GFCF-to-GDP ratio has remained broadly stable for the euro area and has risen slightly in the group of four peer countries considered in this paper (Germany, France, Italy, and Portugal), Spain's ratio has steadily declined. This relative weakness is broad-based but again most striking in the two most underperforming components: transport equipment and other construction. In both cases, GFCF-to-GDP ratios remain well below pre-pandemic levels and below those of peers, suggesting that the shortfall in these two investment categories is not region-wide but more specific to Spain. In the case of transport, however, the persistent weakness in investment could also reflect several sector-specific challenges such as high costs associated with fleet renewal, particularly in the context of the green transition; limited access to charging or refueling infrastructure; and potential regulatory or licensing hurdles that create uncertainty or raise compliance costs.



Sources: Have Analytics and IMF Staff calculations.
Note: GFCF is expressed in percent of GDP, with 2019Q4 set as the base value of 100; 4-quarter MA smoothing. Peer countries include: Germany, France, Italy, and Portugal. EAs' GFCF-to-GDP excludes Ireland from the sample.

7. The weakness of Spain's GFCF-to-GDP ratio relative to peer countries also hints at a broader disconnect from fundamentals. While real GDP in Spain has rebounded more strongly than in many euro area economies, this strength has not been mirrored in the performance of investment. The divergence suggests that investment has not responded as would be expected given the underlying economic conditions—a gap we explore in more formally in the empirical analysis that follows.



C. Data and Empirical Strategy

Data

8. To assess the drivers of Spain's weak investment recovery, we draw on both macroeconomic and firm-level data. The macroeconomic dataset covers Spain from 1995 to 2024 at quarterly frequency. It includes GDP, GFCF and its subcomponents, including machinery and equipment (transport and other equipment) and construction (housing and other construction), corresponding GFCF deflators, and the 10-year government bond yield. All variables are expressed in constant 2015 prices and sourced from the National Statistics Institute (INE).

9. The firm-level dataset covers 5.1 million firms in Spain, Germany, France, and Italy for the period 2003 to 2022. The data is sourced from the Orbis Bureau Van Dijk (BvD) database, complied by the IMF's Research Department (Díez and others, 2018). The Orbis database covers all firms registered with national business registries and is considered broadly representative of business dynamics in most of the large euro area economies (Gopinath and others, 2017). However, smaller firms may still be underrepresented due to lighter reporting requirements and less consistent self-reported data, which can lead to missing information. To ensure alignment with national statistics, the analysis focuses on ten economic sectors where Orbis data closely match sectoral employment and value-added growth reported by Spain's National Statistics Office since the early 2000s (2023 Selected Issues Paper). These sectors include manufacturing, construction, wholesale and retail trade, transport, accommodation and food services, information and communication, professional and technical services, education, health, entertainment, and other services (Annex Table II. 1). Together, they account for approximately 80 percent of total value added and 70 percent of employment in the Spanish economy.

Empirical Strategy

10. The analysis combines macro- and micro-level empirical models to gauge the dynamics and drivers of investment in Spain. We estimate an Error Correction Model (ECM) at the macro level, and a firm-level investment model at the micro level.

11. The macro model's specification is based on neoclassical investment theory (Hall and Jorgenson, 1967; Caballero, 1999). The ECM includes a long-run equation that captures the equilibrium relationship between investment and its fundamentals, along with a short-run equation that describes how investment adjusts toward its long-run relationship. In the baseline specification, the long-run equation is consistent with neoclassical investment theory and takes the following form:

$$\ln(i_t) = \phi_0 + \phi_1 \ln(y_t) + \phi_2 ucc_t + \epsilon_t, \quad (1)$$

where i_t is GFCF, y_t is GDP (both in real terms), and ucc_t is the real user cost of capital defined as $ucc_t = (r_t + \delta)P_k$. Here r_t is the 10-year government bond yield, adjusted for inflation using the Fisher equation, P_k is the real price of capital deflated by the CPI, and δ is the depreciation rate set to zero for simplicity.[2]

The short-run dynamics are modeled as:

$$\Delta\ln(i_t) = \sum_{i=0}^{2} \alpha_i \Delta\ln y_t \sum_{i=0}^{2} \beta_i \, \mathrm{ucc}_{t-i} + \sum_{i=1}^{2} \gamma_i \Delta\ln i_{t-i} - \delta EC_{t-1} + \varepsilon_t, \quad (2)$$

with the error correction term defined as:

$$EC_{t-1} = \ln(i_{t-1}) - \phi_1 \ln(y_{t-1}) - \phi_2 ucc_t.$$

The model is estimated using quarterly data from 1995 to 2020 so it can then be simulated dynamically out of sample to check its ability to capture the recovery path of capital formation after its sharp contraction in 2020. Estimations are performed for total capital formation as well as separately for its two main subcomponents—machinery and equipment and other construction—each using its respective GFCF deflator and real user cost of capital. We focus on other construction, rather than total construction (which includes housing), as housing investment is influenced by residential house price dynamics and other supply and demand factors in the housing market, which require a model specification tailored specifically to that sector.

12. To account for the role of uncertainty, we also estimate the model augmented with an index of Economic Policy Uncertainty (EPU). The literature has emphasized the adverse effects of uncertainty on investment, including periods of heightened economic policy uncertainty (e.g., Bloom, 2009; Baker, Bloom and others 2016). Higher uncertainty may lead firms to delay or reduce

[2] Given that the product of the relative price of capital and the elasticity of substitution ($P_k \times \sigma$) remains broadly stable over time, the long-run effect of the depreciation rate on investment is absorbed by the constant term ϕ_0.

investment, particularly in irreversible or long-horizon projects. Incorporating the EPU index for Spain proposed by Ghirelli and others (2019) allows us to test whether and to what extent EPU—but also uncertainty more broadly—has contributed to the weak post-pandemic investment recovery in Spain.

13. To analyze the microeconomic drivers of investment, we estimate a firm-level panel regression using annual data for Spain, Germany, France, and Italy. The baseline model is specified, similar to Asker and others (2015) and IMF (2019), as follows:

$$\mathrm{NetInv}_{\mathrm{cji,t}} = \beta_0 + \beta_1 \mathrm{Age}_{\mathrm{cji,t-1}} + \beta_2 \ln\left(\mathrm{Size}_{\mathrm{cji,t-1}}\right) + \beta_3 \Delta \ln\left(\mathrm{Sales}_{\mathrm{cji,t-1}}\right) + \beta_4 \mathrm{Profit}_{\mathrm{cji,t-1}} \quad (3)$$

$$+\beta_5 \mathrm{Markup}_{\mathrm{cji,t-1}} + \beta_6 \mathrm{Leverage}_{\mathrm{cji,t-1}} + \mathrm{firm}_{\mathrm{i}} + \mathrm{cty}_{\mathrm{c}} \times \mathrm{year}_{\mathrm{t}} \times \mathrm{Nace4}_{\mathrm{j}} + \varepsilon_{\mathrm{cji,t}},$$

where $\mathrm{NetInv}_{\mathrm{cji,t}}$ denotes the net investment rate of firm *i*, in sector *j*, and country *c*, at time *t*. The net investment rate is defined as the change in the value of fixed assets between two consecutive years, expressed relative to the previous year's fixed assets. Explanatory variables include lagged firm-level characteristics: age, size (proxied by fixed assets), real sales growth, profitability, market power (measured by markup), and leverage. All variables are in real terms and defined in more detail in Annex II. Firm fixed effects control for time-invariant heterogeneity, while fully interacted country-year-sector (4-digit sector, Nace4) fixed effects absorb common shocks at the country-sector level. The regression is estimated at the firm level using annual data, weighted by firms' size.

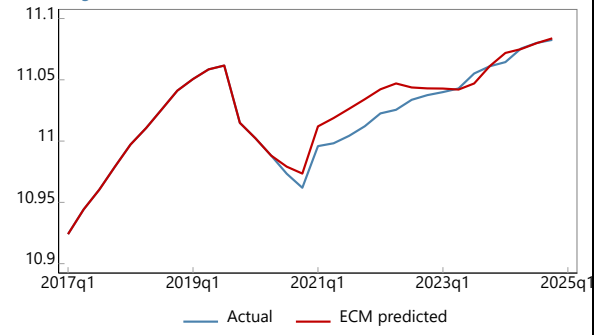
14. To assess how the investment behavior of Spanish firms may have changed since the pandemic, we augment the baseline specification by interacting key firm-level variables—age, size, profitability, and leverage—with country and post-pandemic period dummies. This approach allows us to assess whether the responsiveness of net investment to these drivers differs between Spain and to other countries, and whether these relationships have shifted in the aftermath of the pandemic. In addition, we estimate the regressions on subsamples of small firms and middle-aged firms—given that small firms account for a large share of the business population in Spain, while middle-aged firms are typically well-established and potential engines of growth.

D. Main Results

Performance of Aggregate Investment Relative to Fundamentals: Macroeconomic Analysis

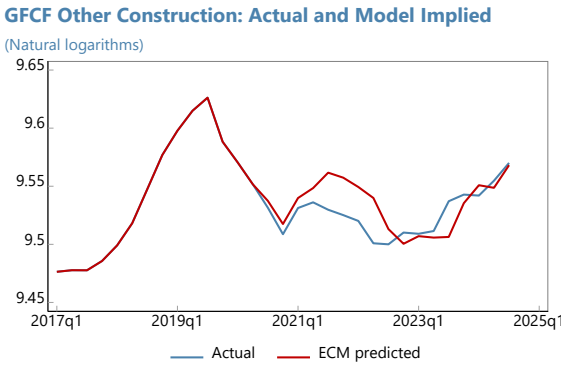
15. Aggregate investment in Spain has performed notably below the level implied by fundamentals, though the gap has narrowed in recent quarters. This finding is based on a comparison of actual capital formation with predicted values from dynamic simulations using the estimated short-term equation (2) outlined in Section C. As of 2024Q4, the cumulative shortfall in capital formation since the pandemic is estimated at around 15 percent. However, actual investment has gradually moved closer to the level implied by fundamentals, particularly over the course of 2023–24. The underlying regression exhibits strong explanatory power, with high R-squared values for both the short- and long-run relationships, and coefficient estimates that are statistically

significant and consistent with theoretical priors. The error correction term is also significant: if investment is 10 percent below its long-run equilibrium, it would rise by approximately 0.29 percent in the following quarter—indicating a very gradual adjustment toward equilibrium. Full regression results are provided in Annex Tables III.1 and III.2.

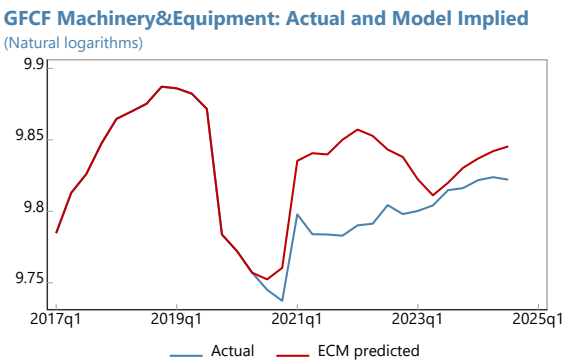


Sources: INE and IMF Staff calculations.

16. The investment shortfall varies across components, with machinery and equipment showing the largest deviation from fundamentals. As of 2024Q4, the cumulative shortfall in capital formation for machinery and equipment is estimated at approximately 56 percent vis-à-vis its model-implied level since the start of the pandemic, indicating a particularly weak recovery for investment in this category. In contrast, the cumulative shortfall in capital formation for other construction is estimated at 16 percent. However, since 2023, actual investment has been converging toward—and in some quarters exceeding—the model-implied level, with the gap narrowing in recent quarters. The model provides a better statistical fit for machinery and equipment than for other construction, possibly because construction investment depends on additional factors—such as construction costs or real estate prices—not captured in the current framework and responds more slowly to long-term fundamentals more broadly. Overall, the results point to a substantial investment gap in tangible assets primarily driven by the underperformance of machinery and equipment, in line with earlier descriptive evidence.

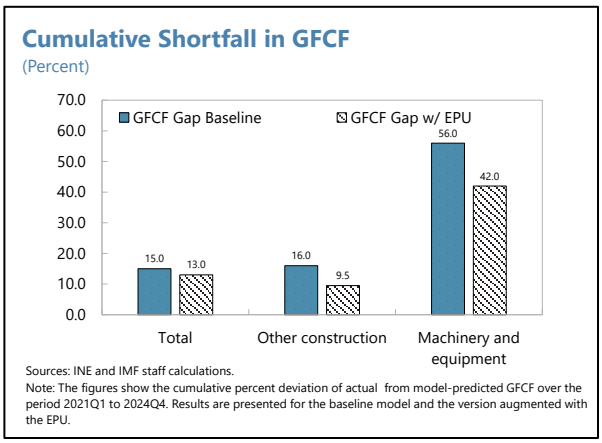


Sources: INE and IMF Staff calculations.



Sources: INE and IMF Staff calculations.

17. Elevated economic policy uncertainty (EPU) may help explain part of the investment shortfall relative to fundamentals observed since the pandemic. EPU spiked sharply during the pandemic and, although it has eased somewhat, it remains above pre-pandemic levels. When incorporated into the error-correction model, EPU has a statistically significant long-run impact on capital formation—total as well as on its subcategories, other construction and machinery and equipment (Annex Table III.1). In the short run, EPU also significantly affects total capital formation and investment in machinery and equipment, though the timing of its effect varies. Importantly, adding EPU to the model reduces the cumulative gap between actual and predicted investment by 2 percentage points overall and by 14 percentage points for machinery and equipment, suggesting that elevated uncertainty—captured by EPU and potentially reflecting broader policy-related concerns—has played a role in holding back the recovery in capital formation relative to fundamentals.

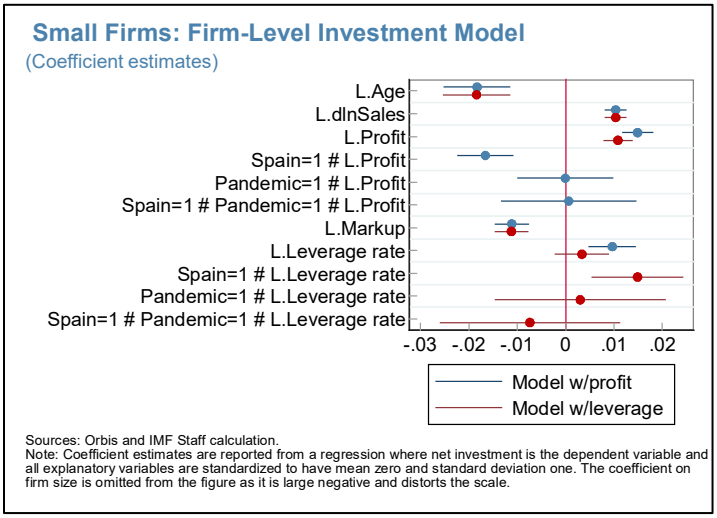


Delving Further into the Drivers of Recent Investment weakness: Firm-Level Analysis

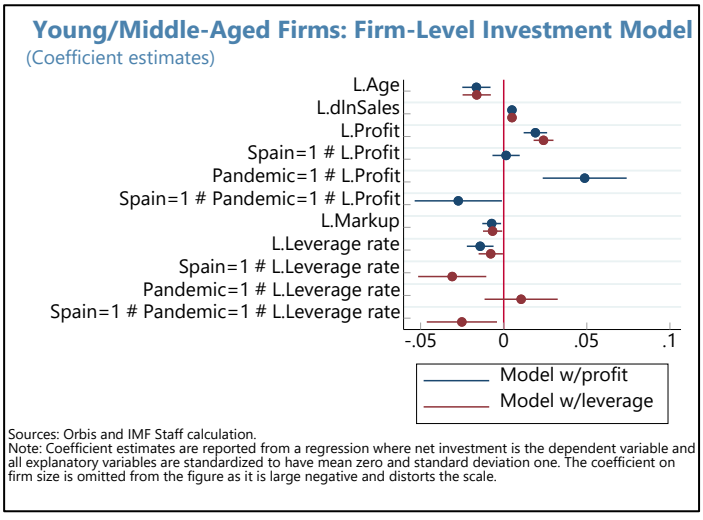
18. Net investment is shaped by a range of firm-level characteristics. Estimates from regression (3) indicate that profitability is one of the key drivers of a firm's net investment rate, consistent with the role of internal funds in financing capital expenditures. The coefficient on lagged profit is statistically significant across all specifications and robust to changes in the fixed effects structure. Firm size, proxied by fixed assets, is negatively associated with the net investment rate, with large and significant coefficients, suggesting that larger firms—possibly due to lower growth opportunities or higher capital adjustment costs—invest less relative to their size. Higher leverage is associated with lower investment, though the estimated coefficients are small and statistically insignificant, indicating a limited average effect of balance sheet constraints—consistent with the fact that high leverage can signal either binding financing constraints that impede investment, or alternatively high growth potential that leads firms to borrow and invest extensively. Markups are also negatively associated with investment, with the effect becoming more pronounced in the tighter specifications with more granular fixed effects. This suggests that firms with greater pricing power may be less inclined to invest, all else equal, in line with economic theory and earlier evidence (see e.g. IMF, 2019). Annex Table III.3 provides a summary of the coefficient estimates across models with varying combinations of fixed effects.

19. To explore whether these relationships differ for Spain and in the post-pandemic period, the same regression is re-estimated on a restricted sample of small firms with added interaction terms. Small firms—a particularly relevant group for Spain, where small firms account for a large share of the economy—are defined as those in the bottom 25th percentile of the size

distribution within each country. Interaction terms for Spain and the post-pandemic period are included for profitability and leverage, as these are firm characteristics expected to play a critical role in shaping net investment—given the importance of internal funds for financing and the potential constraints linked to high debt. First, while more profitable small firms generally invest more, this relationship is significantly weaker in Spain—suggesting that profits do not translate as much into investment, possibly due to heightened uncertainty or a more short-termism behavior. Second, leverage is more positively associated with investment in small firms in Spain compared to other countries, indicating that debt may be acting more as a signal of financial capacity rather than as a constraint in this group.



20. A similar exercise is conducted for young- and middle-aged firms—defined as those that are 10 years old or younger. These firms are already established but those among them that still have high growth potential are often seen as a key engine of economic growth. To examine whether their investment behavior differs for Spain and in the post-pandemic period, the regression is re-estimated on this restricted sample, including interaction terms for Spain and the post-pandemic period for both profitability and leverage. The results point to two main findings. First, more profitable young- and middle-aged firms generally invest more, but this relationship is significantly weaker for Spanish firms in the post-pandemic period. As with small firms, this suggests that profitability does not translate as much into investment in Spain, perhaps due to heightened uncertainty or other drags on incentives to expand. Second, more leveraged young firms invest less, consistent with the presence of binding credit constraints for this particular group, and this negative relationship is more pronounced for Spanish firms in general as well as, even more so after the pandemic. This suggests that young firms may differ from small firms, for which a disproportionate role of credit constraints could be detected for Spain in the analysis above—with this difference becoming starker during the post-pandemic period.



Robustness Checks

21. The macro- and firm-level empirical results are robust to a range of model specifications. In the error-correction model, the findings remain broadly unchanged when the long-term coefficient on GDP is restricted to unity as would be expected in a steady state. Similarly, under the baseline macro specification, the results hold when additional control variables—such as consumer confidence, term premia, financial constraints, and terms of trade—are included. For the firm-level analysis, the baseline findings for the unconstrained sample are robust to alternative specifications with different combinations of fixed effects, as reported in Annex Table III.3. Moreover, the results are robust across different combinations of explanatory variables and do not hinge on the inclusion or exclusion of any one of them.

E. Conclusion And Policy Considerations

22. Spain's investment post-pandemic recovery has been weak, falling short of both fundamentals and the performance of euro area peers. The shortfall spans all major components of investment, with transport equipment showing particular weakness. Both macro- and firm-level evidence point to elevated uncertainty—including stemming from domestic policy—as a drag on the recovery. Investment among small and young- to middle-aged Spanish firms has become less responsive to profitability—particularly during the post-pandemic period—potentially suggesting that uncertainty has curbed their willingness to invest even when profitability was strong. Furthermore, leverage has been a stronger drag on investment for young- and middle-aged Spanish firms, hinting at greater difficulties in accessing external finance during the pandemic. Taken together, these findings point to uncertainty and financial constraints as possible factors having held back investment among firms—small and younger to middle-aged—that contribute significantly to employment and growth in Spain. While the broad improvement in financial conditions since the start of the ECB's easing cycle may disproportionately benefit Spanish firms' investment going forward, persistent uncertainty—both domestic and global—could continue to weigh on the investment outlook.

23. To support a stronger and more broad-based investment recovery, policy should target the key frictions holding back firms—namely, elevated uncertainty and financial pressures facing younger firms. Reducing policy uncertainty through clearer, more predictable tax, spending, and regulatory frameworks would help restore firms' willingness to invest, particularly in an environment where global uncertainty remains high. Easing financing constraints—especially for young high-growth firms—requires continued efforts to strengthen access to credit and equity finance, including by promoting the EU's Capital Markets Union and through targeted support as needed. In addition, addressing structural barriers in specific sectors—such as construction—remains essential. In particular, advancing amendments to the Land Law and streamlining construction permitting processes would help unlock stalled projects and support much-needed investment in infrastructure and housing, with positive impacts on the broader investment recovery. Finally, full execution of planned NGEU investment projects should also continue to support investment in Spain compared to most other euro area peers.

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Annex I. Macro-Level Data

Variable Definition

1. The variables used in the error-correction model described in the main text are defined as follows:

- i: Gross fixed capital formation, measured in real terms (millions of 2020 euros).
- y: Gross domestic product (GDP), also measured in real terms (millions of 2020 euros).
- ucc: User cost of capital, defined as $ucc_t = (r_t + \delta)P_k$, where r_t is the 10-year government bond yield deflated by the consumer price index (CPI), P_k is the real price of capital (deflated by the CPI), and δ is the depreciation rate, set to zero.
- $Economic\ Policy\ Uncerainty$ (EPU): The log EPU variable is converted into a categorical variable indicating quartiles of its distribution, with values from 1 (lowest uncertainty) to 4 (highest uncertainty). The data is sourced from Haver Analytics (Ghirelli, Perez, Urtasun, 2019).

Annex II. Firm-Level Data

Sample Selection

1. To ensure alignment with national statistics, the analysis focuses on ten economic sectors where Orbis data closely match sectoral employment and value-added growth reported by Spain's National Statistics Office since the early 2000s. The table below summarizes the number of firms by sector and countries selected for our firm-level analysis. All variables are symmetrically winsorized at the 2.5 percent level.

Annex II. Table 1. Spain: Number of Firms by Sector and Country

NACE 1-digit Sector	Spain	Germany	France	Italy
Manufacturing	155,660	71,101	161,824	255,418
Construction	286,887	65,925	337,147	319,044
Wholesale and retail trade; repair of motor vehicles and motorcycles	362,106	99,527	513,515	416,505
Transporting and storage	57,185	21,607	71,145	70,103
Accommodation and food service activities	112,265	11,400	217,586	149,200
Information and communication	48,799	22,793	95,834	97,760
Professional, scientific and technical activities	153,701	62,278	268,830	163,345
Education	23,071	3,254	31,131	18,611
Human health and social work activities	33,031	11,790	32,717	37,376
Arts, entertainment and recreation	28,347	5,049	26,339	42,056
Other services activities	27,358	10,325	79,857	30,073
Total	1,288,410	385,049	1,835,925	1,599,491

Sources: Orbis.

Variable Definition

2. The variables used in the firm-level investment model described in the main text are defined as follows:

- *Net investment rate*: the change in the value of fixed assets (deflated and purchasing power parity adjusted), divided by the previous year fixed assets (i.e. 1-year lagged value of fixed assets).
- *Age*: a categorical variable that assigns firms to age groups based on their age.
- *Size*: the value of a firm's fixed assets (deflated and purchasing power parity adjusted).
- *Sales*: the growth in annual sales (deflated and purchasing power parity adjusted).
- *Leverage*: the ratio between the sum of long- and short-term debt relative to total assets (all deflated and purchasing power parity adjusted).

- *Profit*: earnings before interests and taxes depreciation and amortization (EBITDA) to total assets (both deflated and purchasing power parity adjusted).
- *Markup*: the ratio of firm's price to its marginal cost, following the De Loecker-Warzynski approach (see IMF WEO, 2019).

Summary Statistics

3. The table below reports summary statistics for the variables included in the baseline firm-level investment model presented in the main text.

Annex II. Table 2. Spain: Summary Statistics

	Mean	Standard deviation	1st Percentile	99th Percentile
Net investment	0.15	0.57	-0.47	2.89
Age	3.89	1.02	2.00	6.00
Ln(Fixed Assets)	11.81	1.72	7.69	15.39
Sales growth	1.82	24.09	-68.84	72.15
Profit	0.11	0.12	-0.15	0.52
Markup	1.27	0.46	0.86	3.27

Sources: Orbis.

Annex III. Regression Output

Error Correction Model Estimates

1. Annex Table III.1 below summarizes the estimated coefficients from the long-run (first stage) regression of the error correction model. The dependent variable is overall GFCF, other construction GFCF, and machinery and equipment GFCF, respectively (all in natural logs). Columns 1–3 present results from the model without EPU, while columns 4–6 show results from the model including EPU.

Annex III. Table 1. Spain: Error Correction Model Estimates (First-Stage)

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Ln(I)	Ln(I_c)	Ln(I_m)	Ln(I)	Ln(I_c)	Ln(I_m)
UCC	-0.040***			-0.020***		
	(0.008)			(0.007)		
UCC (M&E)			-0.045***			-0.033***
			(0.005)			(0.005)
UCC (OC)		-0.026*			0.012	
		(0.015)			(0.013)	
Ln(Y)	0.595***	-0.092	0.737***	1.132***	0.827***	0.996***
	(0.107)	(0.183)	(0.071)	(0.114)	(0.206)	(0.083)
EPU (quartiles)				-0.086***	-0.149***	-0.040***
				(0.011)	(0.020)	(0.007)
Constant	3.582***	10.928***	0.550	-2.967**	-0.291	-2.618**
	(1.348)	(2.302)	(0.890)	(1.423)	(2.560)	(1.032)
Observations	100	100	100	96	96	96
R-squared	0.601	0.034	0.866	0.707	0.388	0.863

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: Ln(I) = log of GFCF, Ln(I_c) = log of GFCF other construction, Ln(I_m) = log of GFCF machinery and equipment, Ln(Y) = log of GDP, UCC = unit cost of capital (as defined in the main text), UCC (M&E) = unit cost of capital (for machinery and equipment), UCC (OC) = unit cost of capital (for other construction), EPU = Economic policy uncertainty.

2. Annex Table III.2 below summarizes the estimated coefficients from the short-run (second stage) regression.

Annex III. Table 2. Spain: Error Correction Model Estimates (Second-Stage)

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Ln(I)	Ln(I_c)	Ln(I_m)	Ln(I)	Ln(I_c)	Ln(I_m)
Ln(Y) = D,	1.119***	0.919***	1.825***	1.094***	0.909***	1.762***
	(0.066)	(0.108)	(0.115)	(0.067)	(0.112)	(0.112)
Ln(Y) = L,	-0.101	0.103	-0.201	-0.106	0.073	-0.260
	(0.135)	(0.143)	(0.222)	(0.136)	(0.148)	(0.219)
Ln(Y) = L2,	-0.290**	-0.094	-0.523**	-0.333**	-0.109	-0.634***
	(0.138)	(0.140)	(0.233)	(0.138)	(0.144)	(0.231)
UCC = D,	-0.004*			-0.004*		
	(0.002)			(0.002)		
UCC = L,	-0.001			-0.000		
	(0.002)			(0.002)		
UCC = L2,	-0.000			-0.001		
	(0.002)			(0.002)		
Ln(I) = L,	0.145			0.127		
	(0.102)			(0.105)		
Ln(I) = L2,	0.261**			0.278**		
	(0.105)			(0.107)		
UCC (OC) = D,		-0.001			-0.001	
		(0.004)			(0.004)	
UCC (OC) = L,		-0.003			-0.003	
		(0.004)			(0.004)	
UCC (OC) = L2,		-0.002			-0.002	
		(0.004)			(0.004)	
Ln(I_c) = L,		0.118			0.129	
		(0.106)			(0.110)	
Ln(I_c) = L2,		0.212*			0.206*	
		(0.107)			(0.112)	
UCC (M&E) = D,			-0.013***			-0.014***
			(0.004)			(0.004)
UCC (M&E) = L,			0.001			0.002
			(0.004)			(0.004)
UCC (M&E) = L2,			-0.002			-0.004
			(0.004)			(0.004)
Ln(I_m) = L,			0.035			0.037
			(0.100)			(0.104)
Ln(I_m) = L2,			0.169*			0.199*
			(0.100)			(0.102)
EPU (quartile) = D,				-0.005*	-0.004	-0.005
				(0.003)	(0.005)	(0.005)
EPU (quartile) = L,				-0.002	0.004	-0.012**
				(0.004)	(0.006)	(0.006)
EPU (quartile) = L2,				-0.000	0.003	-0.005
				(0.003)	(0.005)	(0.005)
EC = L,	-0.029*	-0.012	-0.142***	-0.050**	-0.027	-0.163***
	(0.015)	(0.013)	(0.049)	(0.022)	(0.019)	(0.057)
Constant	-0.001	-0.005*	-0.001	-0.000	-0.004	0.000
	(0.002)	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)
Observations	98	98	98	94	94	94
R-squared	0.834	0.556	0.832	0.845	0.569	0.855

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Note: Ln(I) = log of GFCF, Ln(I_c) = log of GFCF other construction, Ln(I_m) = log of GFCF machinery and equipment, Ln(Y) = log of GDP, UCC = unit cost of capital (as defined in the main text), UCC (M&E) = unit cost of capital (for machinery and equipment), UCC (OC) = unit cost of capital (for other construction), EPU = Economic policy uncertainty EC = Error correction term. D, L, and L2 refer to first log-difference, its first, and second lag, respectively.

Firm-Level Investment Model Estimates

3. Annex Table III.3 summarizes the estimated coefficients for the baseline regression using the full sample. All explanatory variables have been standardized to have a mean of zero and a standard deviation of one.

Annex III. Table 3. Spain: Net Investment: Firm-Level Estimates

	(1)	(2)	(3)
	Net investment	Net investment	Net investment
L.Age	0.0113	0.0106	0.0101
	(0.0136)	(0.0135)	(0.0179)
L.lnFixed Assets	-1.024***	-1.022***	-1.020***
	(0.0577)	(0.0580)	(0.0628)
L.dlnSales	0.00215*	0.00181	0.000976
	(0.00122)	(0.00124)	(0.00165)
L.Profit	0.0429***	0.0434***	0.0474***
	(0.00306)	(0.00298)	(0.00407)
L.Markup	-0.00692***	-0.00709***	-0.00838
	(0.00201)	(0.00211)	(0.00514)
L.Leverage rate	-0.00766	-0.00760	-0.00599
	(0.00764)	(0.00768)	(0.01000)
Constant	1.740***	1.738***	1.735***
	(0.0775)	(0.0781)	(0.0822)
Observations	7,713,968.00	7,716,057.00	7,716,330.00
R^2	0.470	0.459	0.442
Firm-level FE	Yes	Yes	Yes
Country-Year-Nace4 FE	Yes	No	No
Country-Year	No	Yes	No
Year-Nace4	No	Yes	No
Country	No	No	Yes
Year	No	No	Yes
Nace4	No	No	Yes

Sources: Orbis and IMF staff calculations.

Note: The dependent variable is net ir

differ based on the fixed effects included in the regression specifications. Industries are classified according to NACE Rev. 2 four-digit sectors. Standard errors are reported in parentheses and double-clustered at the firm and year level.

* p < 0.10, ** p < 0.05, *** p < 0.01.

SPAIN'S PRODUCTIVITY GAP VIS-À-VIS EUROPE AND THE UNITED STATES: DIAGNOSIS AND REMEDIES[1]

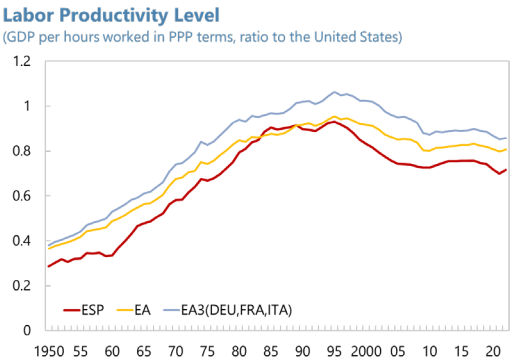
Spain's large GDP per capita gap with highest-income euro area economies and the US is primarily driven by a productivity shortfall. Spanish leading firms, particularly in the tech sector, trail leading global counterparts in productivity and innovation, partly reflecting much weaker R&D investment rooted in lesser reliance on equity. Looking beyond Spain's leading firms also uncovers a broader lack of dynamism. Firms enter the market small and fail to scale up, resulting in a much smaller economic footprint of young high-growth firms in Spain compared to European peers and—even more so—the US. This much rarer occurrence of "gazelles" in Spain partly reflects limited access to venture capital and adequate human capital, as well as tax and regulatory obstacles to firms' growth. Taken together, this comparative lack of dynamism of leading and young high-growth firms alike account for Spain's notoriously large share of small firms. Potential policy remedies include enhancing Spain's product market integration and young firms' access to long-term risk capital through both domestic and EU-level initiatives, and improving the innovation ecosystem including the quality of higher education.

A. Background and Motivation

1. Spain's significant per capita income gap with highest-income euro area economies and the United States primarily reflects a wide productivity shortfall (Figure 1)**.** In 2024, Spain's income per capita in PPP terms stood nearly 40 and 16 percent below that of the US and the other three largest euro area economies (Germany, France and Italy), respectively. While both lower capital intensity and fewer total working hours accounted for some of the gap vis-à-vis the US, weaker total factor productivity drove over two-thirds of it. In the second half of the 20th century, European

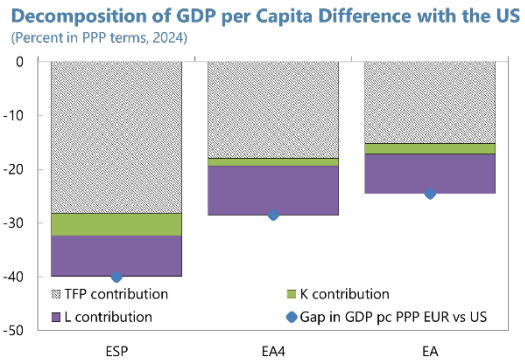
Figure 1. Aggregate Productivity Gap: Spain vis-à-vis Europe and the US

Spain lags the US and its European peers in terms of labor productivity.



Sources: Long-term Productivity Database, WEO and IMF staff calculations.

The GDP per capita gap vis-à-vis the US mainly reflects comparatively lower total factor productivity (TFP).



Sources: WEO, AMECO and IMF staff calculations.

[1] Prepared by Ippei Shibata (EUR).

economies significantly narrowed—and for some of them closed—their hourly productivity gap with the US, often considered to define the "global productivity frontier" in many industries and overall. Meanwhile, following its democratic transition in the late 1970s and subsequently its EU accession in 1986, Spain reduced its productivity gap vis-à-vis other leading European economies. However, since the late 1990s, the productivity gap of European economies with respect to the US has widened again, while that of Spain vis-à-vis Europe has reopened and is now about as wide as it was 25 years ago despite some reduction in the last few years. Furthermore, it remains to be seen whether Spain's favorable recent productivity performance vis-à-vis the rest of Europe will be temporary or structural.

2. This paper examines the underlying factors behind Spain's productivity gap from a firm-level perspective, offering key insights into how Spanish firms compare to their counterparts in other European countries and the US. Drawing on the IMF (2024) and Adilbish and others (2025), it analyzes these issues through the lens of the life cycle of firms, focusing on both frontier firms (leading firms) and those behind the frontier (particularly young firms). The paper first compares the performance of leading (listed) Spanish firms to their European and US counterparts in terms of productivity growth and innovation. It then turns to firms behind the frontier, exploring the dynamics of young and small firms in Spain including compared to their counterparts in other countries. The paper specifically zooms onto high-growth young firms or "gazelles" and the challenges they encounter in scaling up, given the well-documented importance of these firms for innovation and productivity. Finally, the paper presents policy options to boost productivity in Spain.

3. This paper leverages extensive cross-country datasets at firm, sector and aggregate levels. It utilizes five distinct corporate datasets (see Adilbish and others (2025) for more details). Aggregate comparisons rely on three databases: (i) Business Dynamics Statistics (BDS), which provides aggregated statistics based on firm-level data for the U.S. (see Decker and Haltiwanger (2024)), (ii) CompNet, which enables us to replicate many of the data points available in BDS for European countries, and (iii) the OECD's DynEmp database, which tracks entry and exit similarly to BDS. Additionally, our two firm-level databases are (iv) Compustat, used to analyze the performance of listed firms in Europe and the U.S., and (v) Orbis, which we use for firm-level analysis of young high-growth firms. A few additional databases are also employed including AMECO—an annual macro-economic database of the European Commission's Directorate General for Economic and Financial Affairs, the Long-term Productivity Database to measure labor productivity, and Pitchbook for the venture capital landscape. Finally, to assess the Spanish innovation ecosystem, various data sources are used including the Program for the International Assessment of Adult Competencies (PIAAC), European Innovation Scoreboard, WIPO Statistics Database, and European University Association Autonomy Scoreboard.

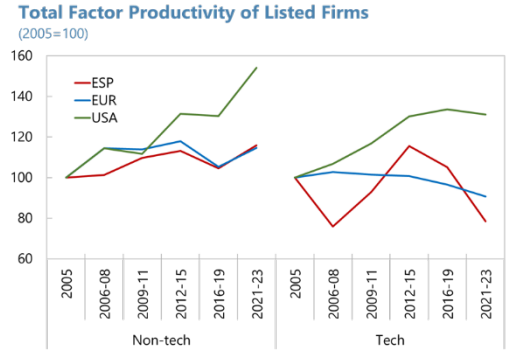
B. Dynamism at the Frontier: Leading Listed Spanish Firms

4. Leading Spanish firms are trailing behind their competitors on both productivity growth and—even more so—innovation, especially in the tech sector (Figure 2). Today, no

Spanish firm features among the top 100 global firms in terms of market capitalization.[2] Moreover, the top two Spanish firms in terms of sales in 2022 were already the top two firms back in 2000, with such lack of churn at the top hinting at lack of business dynamism. Looking across sectors, in non-tech sectors US listed firms have increased their average productivity by around 60 percent between 2005 and 2023, while Spanish and European listed firms achieved cumulative productivity growth of just around 20 percent—one third of US gains—over the same period. In the tech sector, US listed firms increased their measured productivity by over 30 percent, while their Spanish and European counterparts experienced productivity declines of around 20 and 10 percent, respectively. This wide productivity growth gap partly reflects the lower R&D investment of European and—even more so—Spanish firms. For instance, despite some improvement in the last few years, Spanish firms' R&D investment is still only about one-sixth of that of European firms, and only one-tenth of that for US firms. Related to this, leading Spanish firms also issue significantly less equity, which is a key source of innovation financing given the difficulty to collateralize R&D investments.

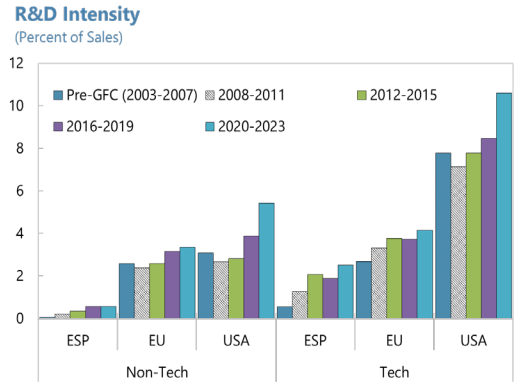
Figure 2. Spanish Listed Firms in International Comparison: Productivity, R&D, and Equity Issuance

TFP in large firms lags US counterparts, particularly in tech…



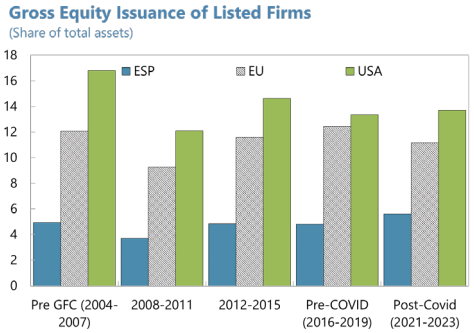
Sources: Compustat and IMF staff calculations.

… reflecting Spanish firms' much lower R&D investment.



Sources: Compustat and IMF staff calculations.

Listed Spanish firms also issue less equity compared to peers.

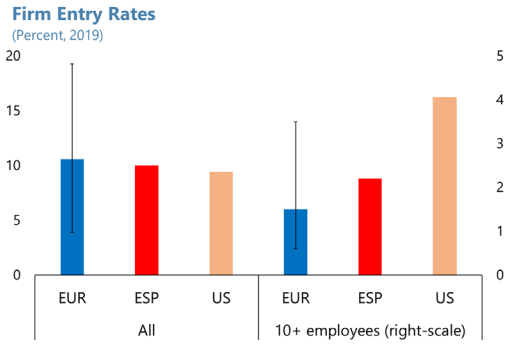


Sources: Compustat and IMF staff calculations.

[2] PWC 2022 report.

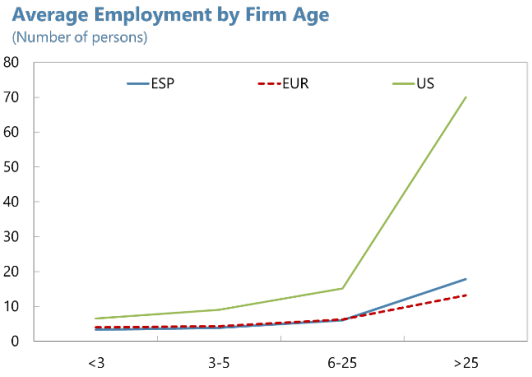
Figure 3. Firm Dynamics in Spain

Spanish firms' entry rates are broadly similar to those in Europe and the US, but they enter smaller than in the US.



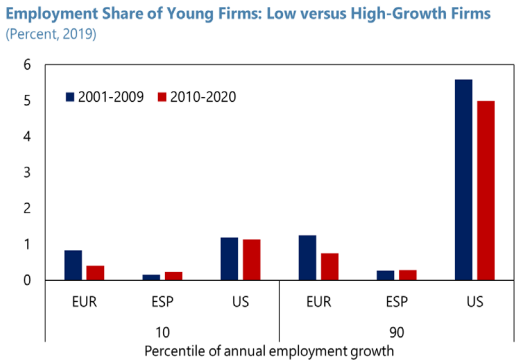
Sources: OECD DynEmp, BDS (US) and IMF staff calculations.

After entry, (surviving) Spanish firms also grow much less rapidly on average than their US counterparts.



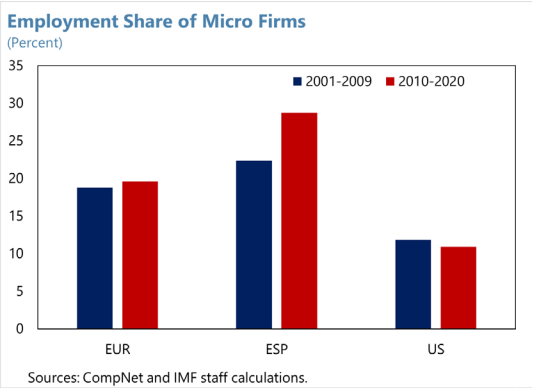
Sources: CompNet and IMF staff calculations.

Young Spanish firms grow much less, and thereby account for a much lower share of overall employment, than peers in Europe and the US…



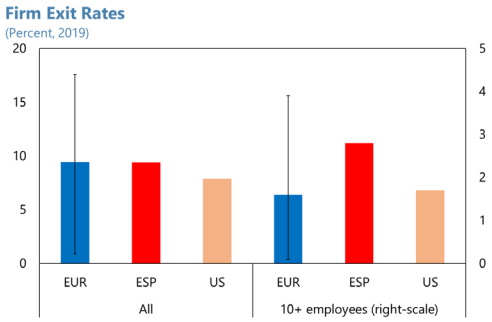
Sources: CompNet and IMF staff calculations.

resulting in a predominance of micro firms



Sources: CompNet and IMF staff calculations.

The exit rate of large (generally more productive) firms is comparatively higher in Spain.



Sources: OECD DynEmp, BDS (US) and IMF staff calculations.

5. The Spanish economy is less dynamic than European peers and—most strikingly—the US, particularly with respect to the footprint of young high-growth firms, resulting in an overabundance of small firms (Figure 3)**.** While average entry and exit rates are broadly comparable across Spanish, European and US firms, Spanish and European firms enter small—entry rates of larger firms (those with 10 or more employees) are lower than in the US. Even more importantly, Spanish and European firms struggle to scale up; as a result, the average employment size of older Spanish firms (aged at least 25 years) is five times smaller than that of their US counterparts. Most striking and Spain-specific is the small footprint of young high-growth firms (above 90th percentile of annual employment growth), which in terms of overall employment share (on average between 2010 and 2020) is about three and eighteen times smaller compared to Europe and the US, respectively. As a result, many Spanish firms remain small, and a sizable fraction of the workforce is employed in less productive micro firms. Turning to firms' exit rates, while they are comparable on average to those in the US and European peers, exit rates for larger firms (with 10 or more employees) are comparatively higher in Spain. This could potentially suggest insufficient exit selection of unviable low-productivity firms as larger firms are typically more productive. Continued improvements in insolvency proceedings, building on recent progress, will be needed to ensure that insolvent but viable firms—which typically enjoy higher productivity and growth prospects compared to their unviable counterparts—are restructured rather than liquidated.

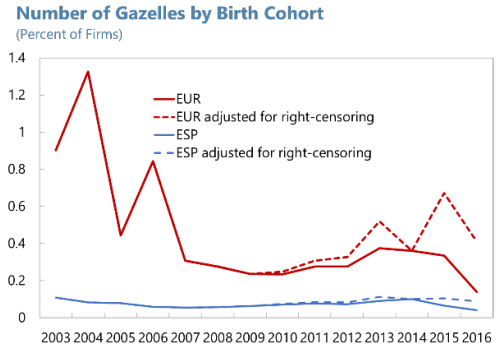
C. Zooming Onto the Emergence of "Gazelles" and their Challenges

6. Young high-growth firms or "gazelles" are rare in Spain (Figure 4)**.** We define "gazelles" as firms that are younger than 10 years old, achieve at least 20 percent annualized sales growth for three consecutive years, and eventually reach 100 employees at some point. On average, gazelles outperform mature large firms in sales growth by nearly 10 percentage points, although this overperformance has diminished compared to pre-GFC years. However, as a fraction of their birth cohort, gazelles are much rarer in Spain compared to other countries. While a typical European country sees about 0.5 percent of a given cohort of firms grow into gazelles, only about 0.1 percent of businesses in Spain reach this status at some point. On a more encouraging note, high-tech firms have been increasing their share among Spanish gazelles in recent years.

7. The scarcity of gazelles in Spain reflects in part financing challenges. Gazelles are underfinanced relative to large mature firms, as indicated by their higher average revenue per unit of assets—which, under some conditions, is indicative of greater marginal productivity of capital. They also face higher borrowing costs compared to their large mature counterparts. These financing difficulties are further reflected in the significantly lower levels of venture capital investment in Spain compared to leading European countries or the US. This shortage of venture capital is concerning, as such investments are typically used to support risky ventures that could foster the emergence of gazelles and boost productivity, particularly in industries (such as high tech) where hard-to-collateralize intangible capital is predominant.

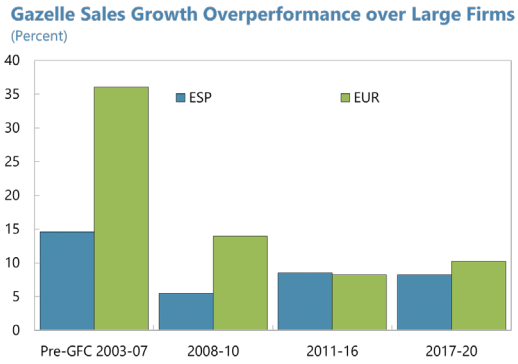
Figure 4. Gazelles in Spain

Gazelles are rarer in Spain compared to European peers….



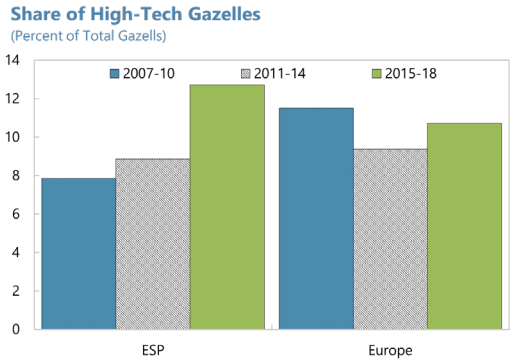
Sources: Orbis and IMF staff calculations.

Gazelles' overperformance vis-à-vis large firms is sizeable although smaller than it was before the GFC.



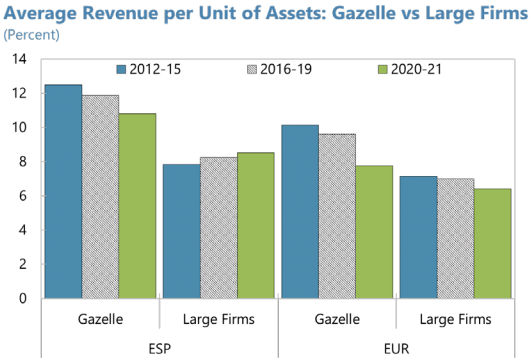
Sources: Orbis and IMF staff calculations.

While Spanish gazelles are rare, the share of high-tech firms among them has grown in recent years….



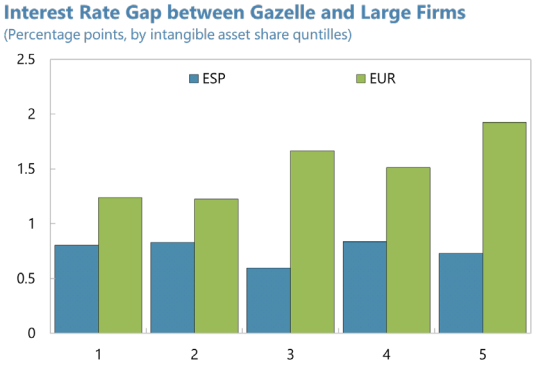
Sources: Orbis and IMF staff calculations.

Gazelles' higher average revenue per unit of assets indicates more binding financial constraints compared to large firms.



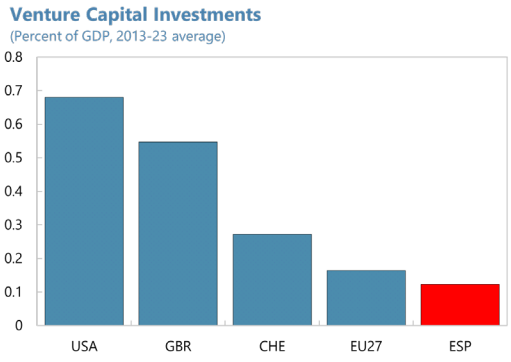
Sources: Orbis and IMF staff calculations.

Accordingly, Spanish gazelles face higher borrowing costs than larger firms, albeit less so than their European peers.



Sources: Orbis and IMF staff calculations.

Aggregate venture capital investment is much smaller in Spain compared to leading advanced countries.



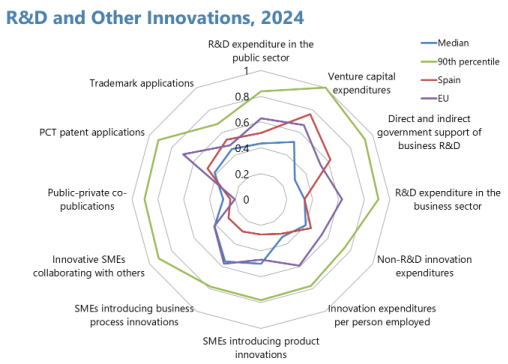
Sources: Pitchbook and IMF staff calculations.

D. Spain's Lagging Innovation Ecosystem and Recent Policy Initiatives to Strengthen it

8. Spain's innovation ecosystem—the interplay between R&D policies, tertiary education and businesses—is lagging behind global and European technological frontiers (Figure 5). In particular, Spain invests less in R&D. Despite the increase in both public and overall R&D expenditures in recent years, they stood at 0.53 and 1.41 percent of GDP in 2022, respectively, which is still below the EU averages of 0.65 and 2.11 percent of GDP and lags some top R&D spenders—for instance, Sweden and Belgium spent 3.47 and 3.29 percent of GDP on overall R&D. For Spain, achieving the targets set by the 2022 Law on Science, Technology, and Innovation (1.25 and 3 percent of GDP for public and overall R&D expenditures by 2030) will require doubling the R&D spending share in GDP. In turn, weak investment in R&D undermines both leading firms' ability to catch up to

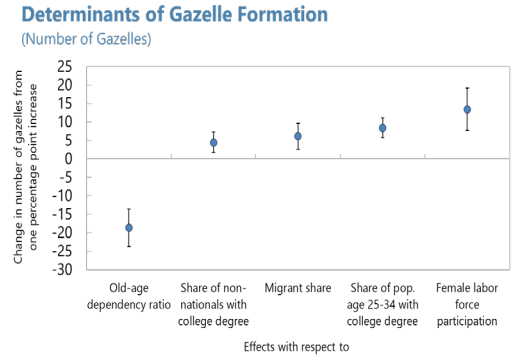
Figure 5. Spain's Innovation Ecosystem

Spain is lagging behind global and European technological frontiers on both R&D expenditures and innovation outcomes



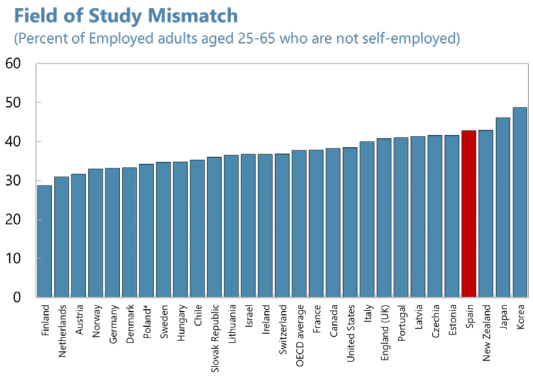
Source: European Commission - European Innovation Scoreboard.

Human capital matters for the emergence of gazelles.



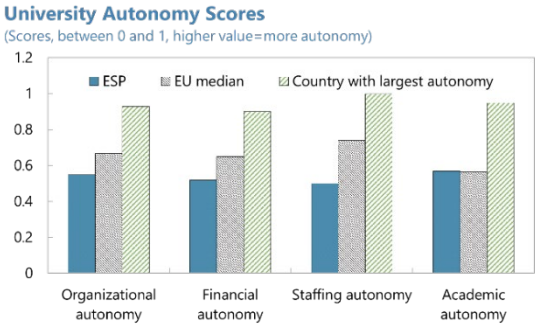
Sources: Orbis; and IMF staff calculations.
Note: Coefficients show the correlation of each variable on the number of gazelles depending on the unit of respective variables. For instance, for regressions on logs, coefficients are interpreted as the change in the number of gazelle formations in response to 1 percent change of the regressor. In Figure 1.10, Europe includes Austria, Belgium, the Czech Republic, Denmark, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, the Netherlands, Poland, Portugal, Romania, the Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom. FTE = Full-time equivalent.

Mismatch in field of study is severe in Spain.



Source: OECD 2023 PIACC Survey.

Spanish university is lagging other European peers in organizational, financial, and staffing autonomy.



Sources: European University Association Autonomy Scorecard 2023 and IMF staff calculations.
Note: Organizational autonomy covers academic and administrative structures, leadership and governance. Financial autonomy covers the ability to raise funds, own buildings, borrow money and set tuition fee. Staffing autonomy includes the ability to recruit independently, promote and develop academic and non-academic staff. Academic autonomy including study fields, student numbers, student selection as well as the structure and content of degrees. Spain's data does not reflect the 2023 University Law Reform.

the global frontier and lagging firms' innovation and technological absorption capacity. Indeed, Spain is also trailing European and global technological leaders when it comes to patent applications. Spain's Patent Cooperation Treaty (PCT) applications remain at 68.7 percent of the EU average. As for human capital, another key pillar of the innovation ecosystem which IMF staff analysis also finds to be an important driver of gazelles' emergence (Adilbish and others, 2025), it remains hampered by mismatch and limited collaboration between universities and businesses. The share of people aged 25-34 who have completed tertiary education exceeds the EU average (52 vs. 43 percent in 2023), but there is a significant mismatch between educational training and the skills required in the job market—in particular, the share of STEM college graduates has been declining in the last 10 years despite strong demand. Compared to successful European peers, lack of autonomy along several key dimensions—organizational, financial, and staffing—has been one reason why the Spanish university education system has struggled to address mismatch and promote innovation.

9. Recent initiatives have been taken by the Spanish government to strengthen the innovation ecosystem and boost productivity. These include:

- Law on the Creation and Growth of Companies in 2022 (Law 18/2022), which aims to simplify the process of starting a business by offering greater flexibility in alternative financing options and encouraging the participation of small firms in public procurement tenders.

- Reform of the Insolvency Law in 2022 (Law 16/2022), which provides greater flexibility and scope for early restructuring. In particular, restructuring plans (pre-insolvency mechanisms) were introduced to enable business debt forbearance at an early stage.

- Law on developing the ecosystem of emerging businesses (Law 28/2022), known as start-up law, which complements the aforementioned two laws and aims to boost entrepreneurship and R&D activities by simplifying the process of setting up innovative firms and offering tax and employment incentives. The law eases the taxation of start-ups by reducing the corporate tax rate from 25 percent to 15 percent for a maximum of four years, as long as the company maintains its start-up status. Additionally, all start-ups benefit from a deferral of tax debt payments during their first two years of operation. Furthermore, to attract investment, individuals can now benefit from a 50 percent (previously 30 percent) tax deduction on investments of up to €100,000 (previously €60,000) in new or recently established companies.

- Science Law (Law 17/2022), which sets a target for government funding of R&D of 1.25 percent of GDP in 2030.

- The Organic Law on the University System (Law 2/2023 or LOSU, by its Spanish abbreviation) enacted in April 2023, which introduces a series of measures aimed at improving the quality of education and adapting the system to the structural challenges facing the Spanish economy. Among other aspects, it sets a minimum public spending target of a one percent of GDP for public university education.

- "Regime 20"—a common regulatory framework to cut administrative barriers to doing business across Spanish regions—that aims to promote a single market within Spain to enable firms to operate more easily across different autonomous regions. Some progress has been made, particularly in identifying key areas for harmonizing and simplifying regional regulatory frameworks. To reduce the informational barriers that firms may encounter when operating across different regions, the government is considering creating a single virtual platform to list and summarize all current local regulations.

E. Policy Options to Boost Productivity

10. Closing Spain's productivity gap vis-à-vis leading European economies and the US requires actions on both EU-level and domestic fronts to facilitate firms' scaling-up and strengthen the innovation ecosystem, including:

- **More integrated markets**, by supporting the Competitiveness Compass initiative and Regime 28 at EU level while domestically making further progress on the "Regime 20" initiative. Such efforts should lower cross-country and cross-region barriers to trade in goods and services, and thereby facilitate the expansion of highly productive young firms. However, being fundamentally a bottom-up initiative starting from the individual topic level, Regime 20 will likely take sustained effort and time to bear fruit.

- **Increasing availability of long-term risk capital**, including further developing the domestic venture capital market through tax incentives and enhanced information provision to investors, as well as advancing the EU Capital Market Union. This is needed to ease financing constraints on the creation and growth of highly-productive young firms. As such, it is a key complement to enhanced product market integration.

- **Streamlining size-based tax and regulatory thresholds**, with a focus on the more stringent labor regulation and stricter tax monitoring that kick in once firms have 50 or more employees and over 6 million euros in annual operating revenue, respectively, as these thresholds can discourage business growth. There is also a need to move toward targeted and temporary support to young innovative firms as opposed to SMEs more broadly, as SMEs include older, less productive and less dynamic firms.

- **Continued improvements in solvency proceedings** to make the firm exit process more productivity-enhancing by ensuring that insolvent but viable firms—which typically enjoy higher productivity and growth prospects compared to their unviable counterparts—are restructured rather than liquidated.

- **Promoting a more innovation-friendly ecosystem by strengthening university autonomy, building on best European practice.** Central to this agenda is to enhance universities' autonomy in the recruitment, promotion and renumeration of professors, make curricula more responsive to evolving labor market demands, strengthen research collaboration with businesses, and increase the share of performance-based public funding of universities.

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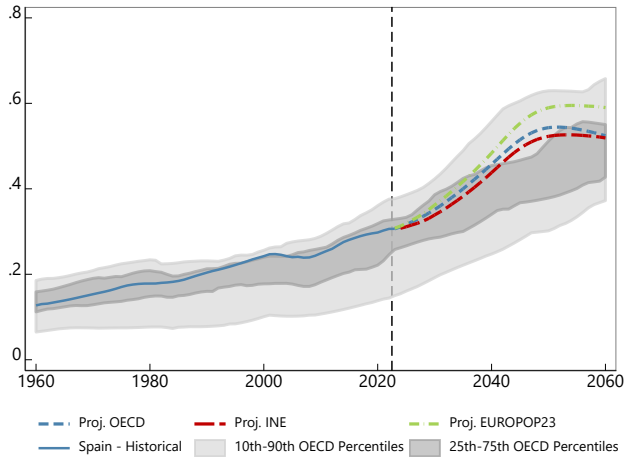
EXPLORING THE DETERMINANTS OF EARLY RETIREMENT[1]

Increased longevity and population aging pose growing fiscal challenges for Spain, which can be mitigated by encouraging greater labor force participation among older workers. Over the past decade, increases in both the minimum and standard pensionable age have led to longer average careers, resulting in significant aggregate employment rate gains. However, a considerable proportion of workers still retire early or exit the labor force several years before reaching retirement age. Therefore, policy action across a broader range of areas is needed to foster further employment growth, by addressing critical issues and constraints to labor force participation among workers aged 55 and above. These include deteriorating health conditions, the need for flexibility in work arrangements, other household-related time commitments—such as caregiving for family members, maintaining in-demand skills, and the financial (dis)incentives embedded in unemployment support programs.

A. Introduction

1. Over the coming decades, Spain faces mounting fiscal pressures driven by the ongoing aging trend of its population. The old-age dependency ratio—defined as the ratio of the population aged 65 and above to the population aged 15-64—grew steadily since the early 2000s, reaching around 30 percent in 2023, and is expected to rise to above 50 percent in 2050 according to multiple sources (Figure 1). The higher number of pensioners for each worker typically associated with a rising dependency ratio entails lower social security contributions to fund the pay-as-you-go pension system and fewer revenues from general taxation to support other aging-related spending. At the same time, as longevity stems from broad-based improvements in health, it inherently reflects greater potential for older individuals to actively contribute to many aspects of society, including economic activities. This implies that the ratio of pensioners to workers need not rise as much as the old-age dependency ratio.

Figure 1. Old-Age Dependency Ratio
(ratio)



Sources: OECD, INE, Eurostat, and IMF staff calculations.
Note: The old-age dependency ratio is defined as the ratio of the population aged 65 and above to the population aged 15-64.

[1] Prepared by Carlo Pizzinelli (EUR) and Rodrigo Barrela (EUR Summer 2024 intern)

2. `To ease some of these fiscal challenges, extending working lives through pension reforms has proven to be effective. Past reforms in Spain progressively raised the minimum and standard pensionable ages, with the latter set to gradually reach 67 by 2028. As a result, the labor force participation rate of older workers has grown steadily over the past decade (Figure 2). Moreover, the 2021-2023 reforms strengthened financial incentives for delayed retirement. Early evidence suggests that these measures are successfully nudging more and more workers to postpone their retirement age. According to data from the Ministry of Inclusion, Social Security, and Migration (MISSMI), the share of delayed retirements among new recipients of old-age pensions has risen from 4.9 to 9.3 percent between 2020 and 2024. Meanwhile, the share of early retirements with reduced benefits among new pensioners has fallen from 27.8 percent in 2020 to 20.2 percent in 2024 over the same period.

3. Going forward, however, other complementary policy actions may be needed to keep extending working lives. Older workers' lives are increasingly complex, and their labor market decisions are not dictated just by financial concerns but also by health, family situations, the ability to keep their human capital up-to-date and to master new in-demand skills. These factors are likely driving many workers to leave employment earlier than originally planned and well ahead of the standard retirement age. As of 2023, the effective average age of exit from the labor force in Spain was estimated at 62 by the OECD (2023) and at 64 by the European Commission (2024) Aging Report, which is below the average age at which new pensioners begin to receive a state pension—estimated to be just above 65 years by MISSMI—and the statutory retirement age—which lied between 65 years and 66 and 4 months, depending on contribution history.[2,3] As individuals continue to work until older ages, these concerns can become binding constraints in their decisions to remain active in the labor force, overriding financial considerations related to pension benefits. This underlines the importance of also improving health outcomes, increasing work flexibility, revising unemployment support schemes, and supporting families with caring needs to help workers stay employed for longer or return to the labor force after having exited.

4. This paper explores older workers' pathways to retirement and their drivers. The analysis builds on the recent study by Barrela et al. (2025), which takes stock of developments in the activity rate of workers aged 55-69 in Spain since COVID-19 and identifies several areas of policy relevance: health, family care needs, unemployment benefit schemes, and flexible working arrangements. To this end, the paper uses a Multinomial Logit (M-Logit) model to examine which personal characteristics and socioeconomic factors are associated with transitions across different labor market states for older workers. It first considers moves out of employment into a set of alternative states: retirement, unemployment, and inactivity due to health, family caring responsibilities or other reasons. It then examines transitions from joblessness either back into employment or into retirement, with the aim of uncovering the drivers of alternative pathways to

[2] The OECD's 2023 Pensions at a Glance report (OECD, 2023) estimates that the effective age of labor market exit in Spain in 2022 was 62 for men and 61.8 for women.

[3] Moreover, the age of first pension includes early retirees, which were approximately 23 percent of new retirees in 2023.

retirement. The results of the M-Logit model subsequently motivate an extended discussion, supported by descriptive evidence, of key themes driving inactivity and early retirement in Spain.

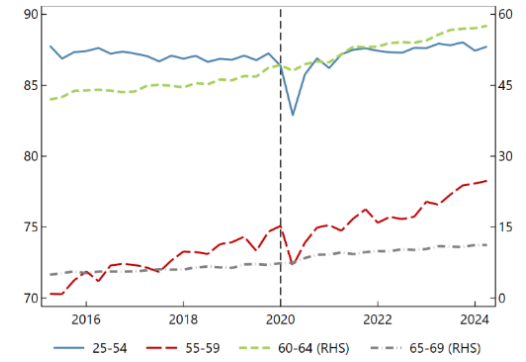
5. Two data sources are employed for the analysis: the Encuesta de Población Activa (EPA) and the Encuesta de Condiciones de Vida (ECV). The EPA, a quarterly survey, serves as the country's primary source of labor market statistics. It has a longitudinal structure that allows following workers over six quarters. The ECV is an annual household survey covering employment, other income sources, health, housing, and broader socio-economic wellbeing issues. It also has a panel structure that follows workers for at most four consecutive years. The ECV is used for the M-Logit model given the broader range of topics it covers, allowing for a more comprehensive study of drivers of transitions across labor market states. Throughout the analysis, the term "older workers" is used to refer to individuals aged 55-69, while "prime-age" workers comprise those aged 25-54.

6. The analysis highlights the diverse set of factors playing into older workers' labor supply decisions, calling for a broad range of policies to support longer careers, in addition to further pension reforms. Greater flexibility in work arrangements, particularly the ability to choose the number of hours worked, is important to strengthen worker retention and reduce early retirement. Addressing the rising constraint posed by adverse health on labor supply requires not only improving overall health outcomes but also the ability of workers with some health limitations to participate in the labor market or to return to employment after a prolonged leave. Reducing the constraints of family caring duties, which are heavily skewed towards women, hinges on fiscal incentives for caring expenses, increasing flexibility in work arrangements, and training programs for those who have remained away from the labor force for long. Finally, while the design of unemployment assistance should be further strengthened to provide stronger incentives for older job seekers to return to work, other structural factors that likely underpin their low job finding prospects should also be addressed. Doing so requires improving re-skilling programs and other active labor market policies (ALMPs).

B. Alternative Pathways to Retirement

7. The labor force participation and employment rates of older workers in Spain have grown steadily over the last ten years while remaining stable for prime-age workers (Figure 2). The rise in the activity rate of older workers has been broad-based across both genders and education levels, but it has been most pronounced for women and those without a university (or post-secondary) degree (Annex Figure 1). While increases in the minimum and standard pensionable ages have been major determinants of increased participation, secular improvements in health and working conditions (such as the decline in physically intensive manual jobs) also likely played a role. On

Figure 2. Labor Force Participation by Age
(percent of population, percent of population)

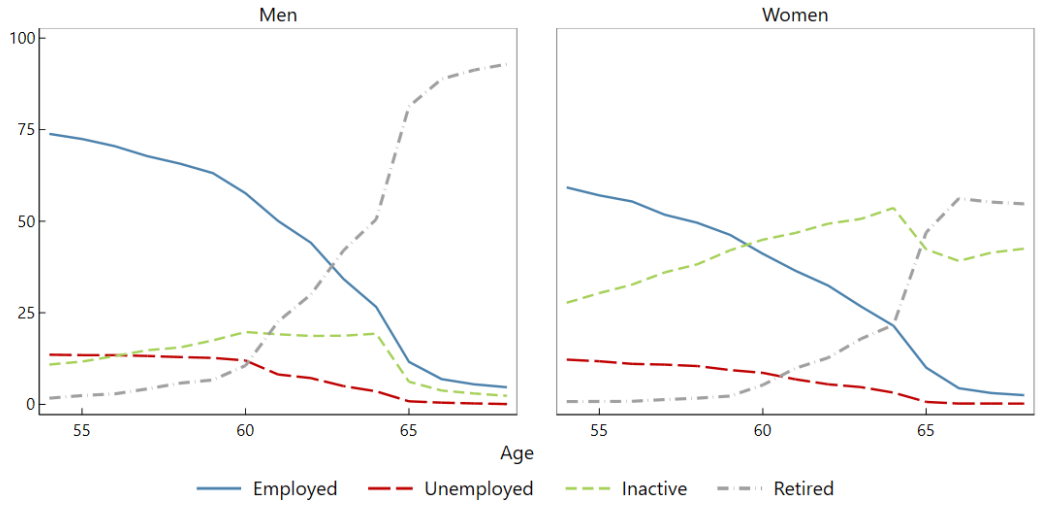


Sources: EPA and IMF staff calculations.
Note: The labor force participation rate is computed as the share of individuals who are either employed or jobless but actively searching for work (unemployed).

the back of higher participation, the employment rate of workers aged 55-69 and above has grown by more than 14 percentage points over the past decade, from 32 percent in 2014 to above 46 percent in 2024. This rise had a material aggregate impact on the economy, as it contributed to an increase in the overall employment rate of approximately 4 percentage points since 2014.

8. Despite such improvements, a significant share of workers still leave employment several years prior to the standard pensionable age, either becoming inactive or retiring early. As Figure 3 shows, for both men and women the employment rate starts declining already in the mid-50's, approximately 10 years before full pension benefits are accrued for most workers. This fall is initially mirrored by a rise in inactivity, which is particularly steep for women, followed by a rise in self-reported retirement after age 60. [4] Meanwhile, unemployment also declines mildly after age 55, as individuals who are out of a job become less likely to actively look for work. This pattern suggests that the decline in employment starting in the mid-50's is not just driven by retirement but also by a set of other channels that, can be defined as "alternative pathways" to retirement (e.g., Duval, 2003; Rogerson and Wallenius, 2022). Using data from 2022-2024, the rise in non-retirement inactivity after age 50 reduces by approximately 6 percentage points the employment rate of male workers aged 51-64 compared to 50-year-old ones, and by 11 percentage points for the employment rate of females.[5]

Figure 3. Labor Market Status by Age
(percent of population)



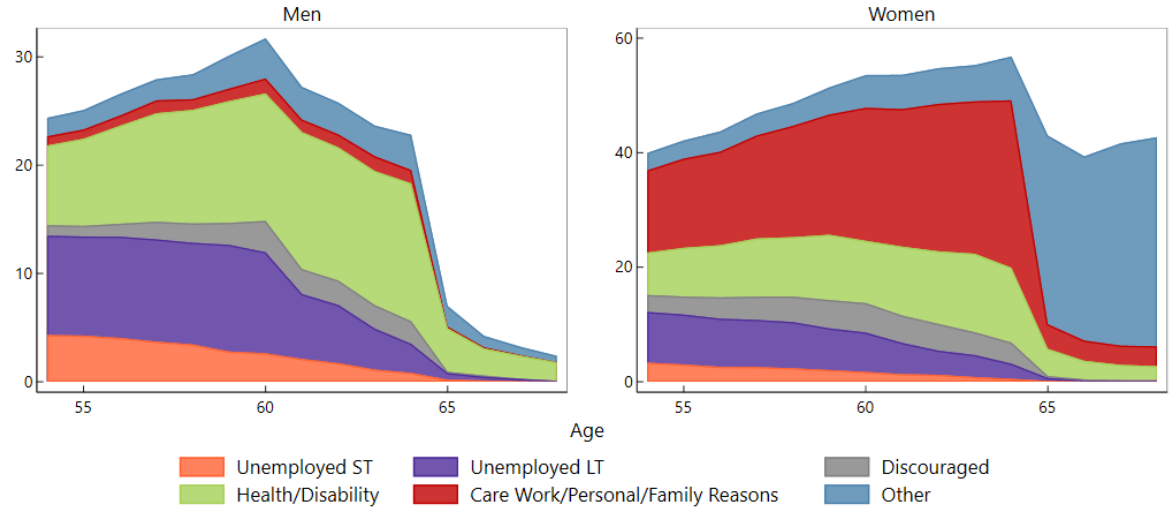
Sources: EPA and IMF staff calculations.
Note: The lines show the share of workers in each labor market status at each age, taking averages over 2014-2024.

[4] For the remainder of the paper, "inactivity" will be used to refer to all states of inactivity other than retirement, unless otherwise specified. "Non-employment" is used to define inactivity or unemployment.

[5] This is computed by creating a counterfactual employment rate for each age between 51 and 64 using 2022-2024 average values. Specifically for each age, the change in the share of non-retired inactive population relative to those aged 50 is first computed. Then this share of workers is reassigned to employment and unemployment, using the age-specific unemployment rate to determine the shares of employed and unemployed workers. Finally, the employment rate of the 51-64 year-olds is computed as the average of the age-specific rates weighted by the age groups' shares in the total population.

9. The evolving states of non-employment among the 55-65 year-olds are indicative of the multiplicity of factors that drive older workers' retirement pathways. Figure 4 breaks down the share of non-retired jobless workers at each age by stated reason for inactivity or duration of unemployment. Among both men and women, inactivity related to health and disability accounts for a large part of the rise in joblessness prior to retirement. Moreover, as the total share of unemployed falls with age, the composition of its remaining pool shifts towards the long-term unemployed (those who have not worked for more than one year), reflecting significantly reduced job prospects. Finally, among women, there is a significant increase in inactivity in the 50's and early 60's due to caring for a family member or for personal reasons. This state is then sharply replaced by the "other inactive" state after age 65. This latter state, which is uncommon among males, mostly captures those women who are permanently out of the labor force but might not consider themselves retired because they do not receive a contributory old-age pension.

Figure 4. Joblessness by Labor Market State
(percent of population)

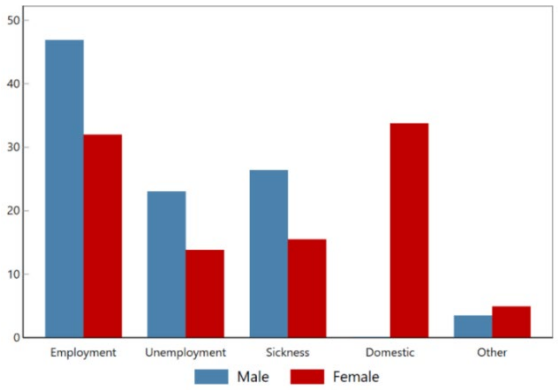


Sources: EPA and IMF staff calculations.
Note: The Unemployed Short-Term (ST) category includes workers who have been unemployed for less than one year. Unemployed Long-Term (LT) includes workers who have been employed for longer than one year. Discouraged workers includes those who have not been looking for a job because they believe they would be unable to find one. Health/Disability includes workers who have been inactive due to health issues and are on either temporary or permanent disability. Care Work/Personal/Family Reasons includes those who report being inactive to take care of a dependent or family member or due to some unspecified reason of personal nature. Other includes all other reasons for inactivity. Values are averages over 2014-2024.

10. A corollary to the importance of non-employment among older workers is that a significant share of transitions into retirement do not occur directly from employment but instead from inactivity and unemployment. Using the ECV, Figure 5 shows that less than 50 percent of new retirees were employed a year prior to retirement. A large share of men, and to a lower extent women, instead transition to retirement from unemployment, suggesting that job loss at older ages is very likely to ultimately turn into a permanent withdrawal from the labor market. Inactivity due to sickness and disability also accounts for 25 percent of new retirees among men and 15 percent among women. Finally, among women, approximately one third of

the newly retired were previously inactive to care for a family member or for other family and/or personal reasons. One reason why alternative retirement pathways are so prevalent is that jobless older workers very infrequently return to employment. As shown in Annex Figure 2, across various categories of older unemployed and inactive individuals, the yearly probability of moving back into work is very low and, importantly, lower than the likelihood of moving into retirement. [6]

Figure 5. Initial Labor Market State of Workers Transitioning to Retirement
(percent of new retirees)



Sources: ECV and IMF staff calculations.
Notes: The bars show the share of individuals who retired in a given survey year by their previous labor market state, within each gender category.

C. Multinomial Logit Model

11. A Multinomial Logit (M-Logit) model is applied to examine quantitatively which worker characteristics are associated with pathways to inactivity and retirement. The M-Logit model sheds light on how explanatory variables of interest are associated with a higher probability of one state compared to another in the following period. To this end, the probability if worker *i* in year *t* moving to labor market state *k = {1, ..., K}* in year *t+1* is computed as follows:

$$P(Y_{i,t+1} = k) = \frac{1}{1 + \sum_{j=2}^{K} e^{\beta_j' X_{i,t}}} \quad \text{for} \quad k = 1$$

$$P(Y_{i,t+1} = k) = \frac{e^{\beta_k' X_{i,t}}}{1 + \sum_{j=2}^{K} e^{\beta_j' X_{i,t}}} \quad \text{for} \quad 1 < k < K$$

where the individual elements of the vector β_k' can be interpreted as an increase in the log-odds of state *k* relative to the base state *k'*=1 from a one-unit increase in the respective element of the vector X. The estimated β's can in turn be used to compute "marginal effects", representing the change in $P(Y_{i,t+1}) = k$ from a one-unit increase in a selected variable in vector X_i , holding all other variables in X_i constant at the original level for individual *i*. Integrating the marginal effect for a given variable across all individuals, the average marginal effect of the variable of interest is obtained.

12. Using the ECV, separate M-Logit specifications are used to explore both transitions for older workers in employment and for those not in employment, respectively. In the first case, the interest is in what characteristics are associated with continued employment or, instead, moving

[6] Annex Figure 3, using data from the EPA, shows a quantitatively similar result for labor market states one year prior to retirement. In the quarters just prior to retirement, the share of non-employment rises further—and particularly inactivity not related to health or family roles—suggesting that a considerable share of workers pass through a short spell of non-employment before retirement that is perhaps planned or at least expected.

from employment to other states, including retirement, health-related inactivity, unemployment, and, especially for women, "domestic" roles—that is caring for family members or tending to the household. The first specification is thus estimated on the sample of workers who are employed in year *t*. A second specification is estimated on the sample of non-retired jobless workers to examine transitions into retirement or back into employment. This second exercise investigates which factors are associated with remaining in a state of non-employment (which includes both inactivity and unemployment), moving into retirement, or returning to work. For both exercises, the sample of individuals includes those aged 55-69 using the panel version of the ECV over 2010-2023, for a total of approximately 26,973 worker-year observations.

Transitions from Employment

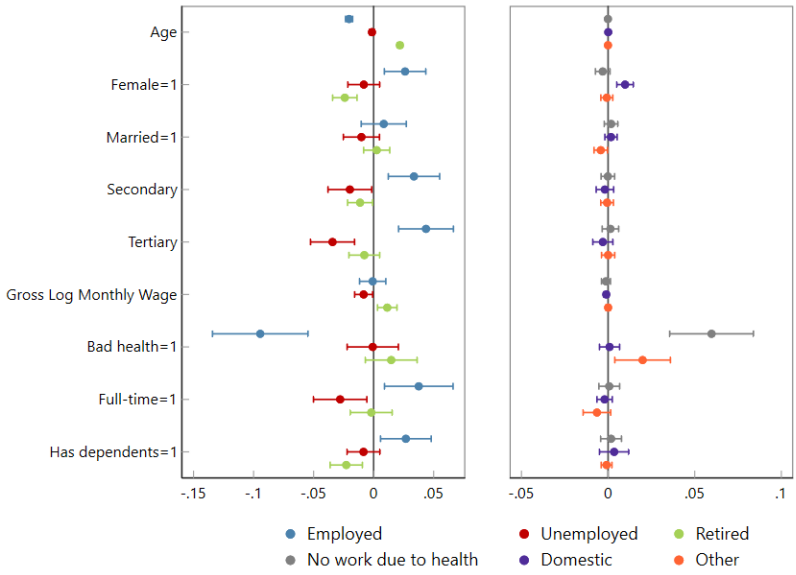
13. The first M-Logit model is estimated on a pooled sample of male and female workers aged 55-69 who are initially employed. Figure 6 shows the estimated marginal effects. Each dot represents the effect of increasing the variable by one unit (or going from zero to one, in the case of dummy variables) on the probability of being employed (blue), unemployed (red), retired (green), inactive due to health (yellow), inactive due to domestic work (purple), and inactivity due to other reasons (orange) at *t+1*. The bands represent 95 percent confidence intervals. By construction, the sum of the coefficients for a given variable over all possible states equals zero. The included variables can be grouped into two categories: demographic factors and job/worker-specific contextual factors that might play into the worker's labor supply decision. The former category includes age, gender, marital status, and bins for education level, with primary schooling being the base value. In the latter category are log gross monthly wages, a dummy variable characterizing whether a worker self-assesses as being in a state of bad health, full-time status, and a dummy for whether the worker has any dependents in the household (including both children and elderly members). Not shown, but also present, are year fixed effects to capture time-varying aggregate developments, such as the general state of the labor market.

14. Demographic characteristics are all significant predictors of older workers' labor market decisions. As expected, when workers age, their probability of remaining employed from one year to the next diminishes in favor of transitioning into retirement. Female workers have a 3-percentage points higher probability of remaining employed compared to males, which comes alongside a lower chance of retirement. At the same time, females are also more likely to move into the "domestic" inactivity category, although the effect is quantitatively small. Education is also a positive predictor of employment: having secondary or tertiary education increases the likelihood of remaining employed by 3 and 4 percentage points, respectively. This positive effect on employment is driven especially by a lower risk of becoming unemployed *vis-à-vis* the baseline group of workers who did not finish secondary school.

15. Other contextual factors, such as health status, full-time work, and having dependents are also significantly associated with transitions out of employment. Workers who claim to have bad or very bad health are much more likely to move to inactivity. This effect is quantitatively strong, with workers in this category having a 9-percentage point lower probability of remaining employed. In line with priors, workers with health issues are very likely to transition to health-related inactivity,

although they also move to other types of inactivity relatively more frequently than those in good health. Conversely, having a full-time job and having any dependents in the household are positive predictors of employment at *t+1*. As explored in more detail below, working full time is likely a proxy for overall job quality, explaining its positive relationship with staying employed (see the sub-section on hours worked in Section D). As workers grow older, working part-time may reflect not just a voluntary decision to progressively transition out of work but also having to endure a more insecure and precarious job, implying higher chances of job loss in the future. This likely explains why the positive association of full-time work with employment is closely mirrored by a lower chance of becoming unemployed (including compared to moving to other types of inactivity). Controlling for having a full-time job, higher monthly earnings are associated with a small rise in the probability of retirement, consistent with a role of income effects in older workers' labor supply decisions.[7] Lastly, and also consistent with a role of income effects, having dependents is associated with a lower likelihood of retirement and, to a smaller extent, unemployment. There is no increase in the probability of moving to "domestic" inactivity, which could be expected if workers had to perform care duties when in this situation. The effect of this variable is mostly driven by young dependents, as discussed below (see the sub-section on domestic inactivity in Section D).

Figure 6. Estimated Average Marginal Effects from M-Logit Model of Transitions out of Employment
(change in transition probability across adjacent survey years)



Sources: ECV and IMF staff calculations
Note: Gross Log Monthly Wage refers to the average monthly wage in the year prior to the survey. Bad health is a self-reported variable which equals one if the respondent claims to have a general health status that can be described as either bad or very bad. Has dependents is a dummy variable which equals one if the worker has a child (< 18) or an elderly (> 65) inactive member in the household. The bands represent 95% confidence intervals.

[7] For log wages, Figure 6 reports the probability change for one log-unit increase in monthly income, corresponding to a 2.7-times rise in earnings. In Spain, such a rise is approximately equal to the ratio of the 75th to 25th percentile of monthly labor earnings, suggesting that, keeping other variables constant, a worker in the 75th percentile of the distribution has a 1-percentage point higher yearly retirement rate compared to one at the 25th percentile.

Transitions from Non-Employment

16. Figure 7 shows the results for the M-Logit model of transitions out of non-employment. Workers in the sample are those who are non-employed and non-retired in the initial period. As in the previous section, the sample considers male and female workers aged 55-69. To obtain better statistical power, it pools workers across different types of non-employment except retirement: that is, unemployment, health-related inactivity (including permanent disability), inactivity for "domestic" reasons, and all other types of inactivity. Possible outcomes in year *t+1* are employment, retirement, and all other non-employment statuses. The set of predictors is somewhat different from that considered in the previous section. The model controls for the initial non-employment status using dummy variables for whether the worker was inactive due to health, domestic, or other reasons at time *t*. As such, the baseline category is unemployment, and the coefficients on the various variables should be interpreted relative to this baseline. Furthermore, the model includes demographic variables such as age, gender, marital status and education level. Lastly, other predictors are the log of gross household income in the initial period, a self-reported bad health state, a dummy variable for whether the worker having any dependents in the household, and a dummy variable for whether the individual received any type of benefits or social assistance in the previous year. These benefits can be unemployment benefits but also other social benefits, such as child allowances or sickness benefits. Not shown, but also present, are year dummy variables.[8]

17. Gender and age are strong demographic predictors of alternative retirement pathways among the non-employed. Similar to the findings in the previous section, age is positively associated with higher chances of retirement and reduced prospects of returning to work. Non-employed women have a 2 percentage points lower job-finding probability compared to men, as well as a 5 percentage points lower probability of transitioning to retirement. These findings show some heterogeneity in the degree of stickiness of the non-employment status across genders, as women are more likely to remain in their current state of inactivity.

18. The type and reasons for non-employment are highly predictive of the chances of returning to work or retiring. Relative to the unemployed (the base group), those who are inactive, regardless of the reason, are more likely to remain jobless in the next period, as seen by the "To employment" coefficients in the first three rows. Health- and domestic-related inactivity in particular seem persistent, as they both imply approximately a 5-percentage points fall in the probability of re-employment. Health-related inactivity is also associated with an increased likelihood of retirement, corroborating the existence of alternative multi-stage pathways to retirement besides transitioning directly from employment. Meanwhile, domestic duties and other reasons for inactivity appear to be more persistent states on non-employment, with also lower transitions into retirement. As noted above, a large portion of those jobless due to domestic work

[8] One possible caveat from this list of control variables is the potential high correlation between some of them. For example, those inactive due to health will probably be in bad health, and vice versa. Receiving benefits, if they are unemployment-related, is also correlated with being unemployed. Therefore, the quantitative effect of these collinear variables may be imprecisely estimated.

are women, often with few years of labor market experience. Hence, their lower likelihood of retirement may partly reflect a low expected old-age pension, or lack of eligibility altogether, due to insufficient social security contributions.

Figure 7. Estimated Average Marginal Effects from M-Logit Model of Transitions out of Non-Employment
(change in transition probability across adjacent survey years)

Sources: ECV and IMF staff calculations.
Note: Does not include previously retired. Gross Log Household Income refers to the average household income in the year prior to the survey. Bad health is a self-reported variable which equals one if the respondent claims to have a general health status that can be described as either bad or very bad. Has dependents is a dummy variable which equals one if the worker has a child (< 18) or an elderly (> 65) inactive member of the household. Has benefits is a dummy variable which equals one if the person received any type of benefits in the year prior to the survey. These can be unemployment, sickness, disability, social assistance or family support benefits. The bands represent 95% confidence intervals.

19. With regard to socio-economic variables, household income, health status, having dependents, and benefit recipiency all matter for the retirement pathways of the non-employed. First, higher-income households are less prone to remain inactive, showing higher probabilities of both re-employment and retirement. This may be a result of higher skills, higher wages in previous employment—and thus, a potentially higher replacement rate in retirement—or larger household financial wealth, which may allow for earlier retirement. Second, those who claim to suffer from bad health conditions have a higher chance of remaining in non-retirement inactivity.[9] This, combined with the marginal effects of being initially in a health-related inactivity state (first row), shows how bad health can strongly hinder re-employment and labor market participation for older workers. Having dependents in the household is also associated with lower transitions into retirement, but not with higher job finding rates, thus also implying greater persistence of non-employment. Lastly, those who received any social assistance benefits in the

[9] Note that this result refers to workers who may not report bad health as being the main reason for why they are inactive. Hence, it implies that also those who are unemployed but suffer from poor health conditions have lower re-employment prospects than healthy unemployed workers.

previous year are more likely to retire at the expense of re-employment and other inactivity transitions.

D. Policy Issues

20. Several of the variables with statistically significant associations to transitions out of employment or from non-employment have a link to structural policy areas. Poor health emerges as a strong predictor of both employment exits and persistent inactivity. Household-specific factors and gender roles seem to also play an important role: the presence of dependent household members is associated with greater employment attachment and lower early transitions to retirement, while a gender-based difference in transitions into "domestic" inactivity, albeit small, is also statistically significant. The negative association between full-time work and employment exits likely masks strong self-selection effects but also calls for a deeper study of how the ability to adjust hours facilitates work at older ages. Lastly, among the jobless, social benefits, either at the individual or household level, seem to be an important factor in workers' decision to exit the labor force through their impact on work incentives. However, to some extent their reception is endogenous to limited prospects of re-employment, calling for more in-depth analysis. Therefore, this section delves into each topic in greater detail to derive some policy implications.

Health

21. Poor health can act as a drag on the labor market participation of older workers. The M-Logit estimates show that bad health is a major driver of exits from employment (Figure 6) and, for those not employed, an impediment to going back to work and moving earlier into retirement (Figure 7). The latter result is in line with Barrela et al. (2025), who show that in Spain health-related exits from employment tend to be long-lasting. Although this applies to both prime-age and older workers, it is a more critical driver of labor market participation for the latter since the incidence of bad health is markedly higher in this group (Figure 8).

22. Several indicators point towards a persistent worsening of health conditions since the onset of the COVID-19 pandemic. Based on the ECV, close to 50 percent of the Spanish population aged 55-69 in 2023 reported being affected by some long-term health condition (Figure 8, top left panel), 35 percent reported some degree of health-related physical limitations (Figure 8, top right panel), and above 2 percent assessed their overall health condition as "very bad" (Figure 8, bottom left panel). These three indicators of adverse health all show a rise since 2016, reflecting not only a long-term trend but also some upward shift since the pandemic. As these measures capture all possible health-related issues, it is not possible to fully disentangle COVID-related health complications from a general health worsening, however. Moreover, being based on self-assessment, this deterioration in health might at least in part reflect a more acute perception of pre-existing conditions or greater awareness of personal health issues (for instance of mental health) rather than concrete changes. Hence, the picture may be more nuanced once more factual measures are considered. Indeed, other indicators in fact suggest that the worsening may not be reflected in more factual measures of severely adverse health conditions. For instance, the share of population

receiving permanent disability support has remained stable or even fallen slightly among the older working-age population (Figure 8, bottom right).

Figure 8. Health-Related Indicators

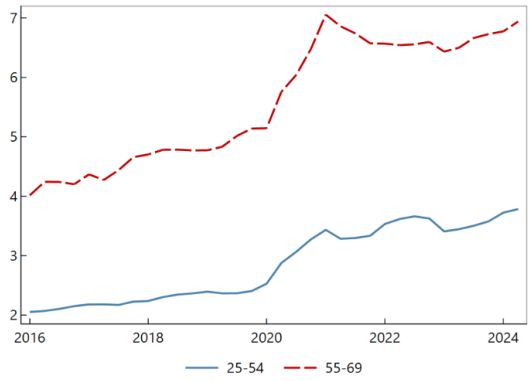
Sources: ECV and IMF staff calculations.
Note: Panel A: Share of people who declare suffering from a chronic (long-standing) illness or condition. Panel B: Share of the population in each age bracket that indicated to be restricted through long-standing limitations in their usual activities due to health problems. These limitations can be of physical, mental or emotional in nature. Panel C: Share of population reporting "very bad" health conditions. Panel D: Share of the population reporting government transfers related to sickness or disability.

23. Although not all indicators point to worsening conditions, poor health has likely been a driver of lower labor supply for older workers in recent years. Health-related work absences, which were already trending upward since 2016, rose sharply starting in 2020 (Figure 9). This pandemic-induced spike was larger for older workers, hinting at some link between the rise in bad health and COVID-19. However, the share of workers on medical leave has remained persistently high, or even increased further, once the pandemic ended, suggesting the presence of other factors. This trend is also reflected in official social security data showing that the yearly number of temporary disability benefits recipients has increased by 37 percent from 6 million in 2018 to 8.1 million in 2023 (Granado Martínez, 2024).

24. Reducing the adverse effect of ill health on labor force participation requires policy action to improve general health outcomes. These policies are not specific to older workers but will have a relatively larger beneficial impact for them. For example, poor health in young and prime ages may not immediately be a constraint to labor force participation, but to a large degree it will eventually translate into poor health at an older age (Tipirneni et al., 2025) and become a drag on labor force participation at that stage.

25. Supporting workers with health limitations so they can remain employed or return to work is also critical. Providing increased flexibility and accommodations, such as work from home and reduced schedules, can improve the labor market attachment of those with reduced capacity to work full time or commute. To this end, the recent proposal by the Ministry of Inclusion, Social Security, and Migration to facilitate voluntary gradual return to work for those receiving temporary disability benefits would be a positive step toward strengthening labor market attachment, as it would limit the potential adverse labor supply effect of protracted absence from work (López-Guillén García and Vicente Pardo, 2018). When such flexible work arrangements are not feasible due to the nature of the worker's previous occupation, job search guidance and active labor market policies could be targeted to help them find new roles that better suit their needs and physical capacities.

Figure 9. Health-Related Work Absentees in Reference Week
(percent of employed workers)

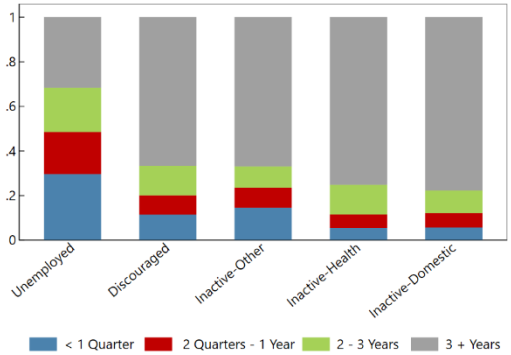


Sources: EPA and IMF staff calculations.
Note: the lines show the share of employed workers who report being absent from work in the reference week due to health-related reasons.

Dependents and Household Duties

26. Domestic-related inactivity is particularly common among women and typically comes together with low labor market attachment. This group comprises those who do not search for work as they are dedicated to household activities, including caring for children and other dependents, or for other family-related reasons. In the ECV, among older women, close to 35 percent of respondents fall under this "domestic inactivity" labor market status. For older men, this figure amounts to only 0.16 percent of the respondents. According to the ECV, on average, domestic-inactive older women have only 15 years of experience in

Figure 10. Average Duration of Joblessness
(share of jobless category)



Sources: EPA and IMF staff calculations.
Note: Each bar reports the share of individuals in each joblessness category who have been out of work for a given period of time.

the labor market, compared to 30 for older women in employment, unemployment or other inactivity types.

27. The analysis suggests that domestic-related inactivity is a highly persistent state. Figure 10 shows that, among all joblessness categories, the domestic-inactive feature the highest share of individuals who have been out of a job for more than 3 years—close to 80 percent. This result is also reflected in the M-Logit estimates in Figure 7, where the probability of remaining out of a job is almost 5 percentage points higher for the domestic-inactive compared to the unemployed. This is further corroborated by Annex Figure 2 (bottom center panel 5), showing that close to 80 percent of the domestic-inactive group remain in that labor market status across two years. At the same time, however, exits from employment directly into this type of inactivity are very infrequent (Annex Figure 2, top left panel). Figure 6 shows that women, who account for the vast majority of this group, only have a 1 percentage point higher probability of moving from employment to domestic inactivity in a given year compared to men, for whom it is close to zero. Taken together, these findings suggest that domestic duties account for a large share of women's inactivity, but they are not a significant driver of new exits from employment among older women. Nevertheless, it is possible that women who leave work for other reasons and stay jobless for a prolonged period eventually take up more household duties and caring roles in their families, ultimately making this their main commitment and thus no longer desiring a job.

28. The fact that the domestic-inactive group is mostly comprised of women suggests that labor supply choices may follow traditional gender norms, but it does not rule out that older males may also face family caring responsibilities. For instance, evidence shows that caring for elderly family members is also common among males. According to CSIC (2023), using data from INE, in 2021 in Spain there were 638,000 individuals with some level of caring duties for people aged 70 or above within their household, and 920,000 for elderly outside of their household. Those aged 50-59 were the group most responsible for these duties, suggesting the responsibilities mostly concerned elderly parents. Moreover, while the majority of carers were women, men constituted a significant 40 percent. This suggests that the incumbency of caring duties affects both men and women, but the main gender-based difference concerns the labor market impact due to the likely uneven burden sharing within the household when facing these family responsibilities.

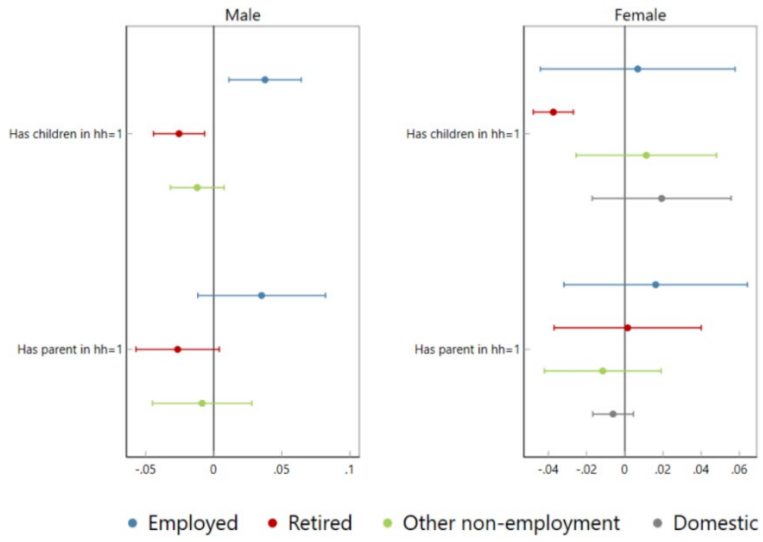
29. When they have dependents, older males are less likely to retire and more likely to stay employed. Figure 11 shows the estimated marginal effects of having dependents for the sample of workers employed in the initial period, separated by gender and distinguishing between dependents below age 18 (i.e., children) and elderly. Results show that males are less likely to become jobless and, therefore, more likely to remain employed than females. The effect is stronger and statistically significant for young dependents: having a child in the household increases the probability of remaining employed by close to 4 percentage points. The effect of having an older dependent in the household is slightly weaker, and not statistically different from zero.

30. For older working women, having dependents, young or old, does not have statistical predictive power on the probability of transitioning out of employment. Given the large share of domestic-inactive women, this result points to stronger sorting into employment or inactivity at

younger ages among women based on the presence of dependents. At older ages, most women who may have decided to stop working to tend to family and caring duties may have already done so by age 55. Figure 12 shows that, for females, within each employment category, the group that has the largest share of dependent children is the domestic-inactive. However, differences are relatively small, suggesting that individual preferences or household circumstances may play a substantial role. For elderly dependents, there is no clear pattern.[10]

31. Supporting the labor force participation of those with family caring duties includes providing flexibility in work arrangements as well as lowering the costs of caring services through public provision and fiscal incentives for purchasing private services. Greater flexibility in reducing hours worked or adjusting work modalities (e.g., telework, compressed work schedules) would make employment and caring duties more compatible. The recent amendment to the Charter of Workers, which grants workers the right to request adjustments to their schedules when caring for a dependent (RDL 5/2023) goes in the right direction. Meanwhile, as working would require greater spending on external care-related services, tax benefits can provide an additional incentive to return to work by lowering the implied cost of this decision. PIT deductions for families caring for an elderly or disabled family member who resides with them—introduced first in 2006 (RDL 35/2006, Art. 59-61) and whose parameters were last updated in 2015—support those who provide assistance while also giving them an incentive to continue working. Finally, several autonomous communities provide PIT deductions for expenses related to childcare and elderly care, including the hiring of dedicated home carer professionals.

Figure 11. Average Marginal Effects of Having Dependents in the Household on the Labor Market Transitions of the Employed, by Gender and Type of Dependents
(change in transition probability across adjacent survey years)

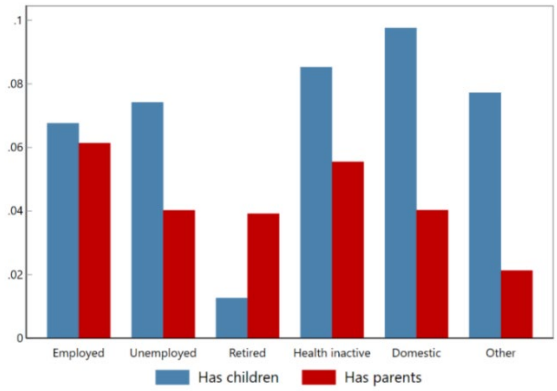


Sources: ECV and IMF staff calculations.
Note: Average marginal effects from a multinomial logit model as in section C, now splitting the dummy for having any dependents in the household into children (< 18 years) and elderly. The model is estimated separately by gender.

[10] An important caveat is that ECV only captures those who live in the same household, but often elderly relatives are not part of the same immediate family unit.

32. Specific support is needed for those who have remained out of the labor force for a prolonged period, once their family caring role is no longer a priority. It is important to make sure that these workers, particularly women, can access guidance services and training programs to re-acquire skills needed in the labor market, which they may have lost. In this regard, the recent reform of unemployment benefits (RDL 2/2024) could be helpful if accompanied by enhance active labor market policies. The reformed *subsidio por desempleo por cotizaciones insuficientes* extends its eligibility to those with just 3 months of social security contributions and dependents, allowing access to the job guidance services provided by public employment offices. The impact of this reform could be strengthened if activation requirements were strengthened.

Figure 12. Share of Women with Dependents in the Household, by type of Dependents and Labor Market Status
(change in transition probability across adjacent survey years)



Sources: ECV and IMF staff calculations.
Note: The height of the bar represents the share of women within that labor market state that have the corresponding type of dependents in the household.

Working Hours Flexibility

33. The ability to choose how much to work is likely to be an important driver of the decision to remain employed at older ages. Although some older individuals prefer to continue working as many hours as in their prime years, aging brings changes in priorities and preferences, weaker health and new family needs. These may drive some workers to seek shorter work weeks. Conversely, having fewer dependents once children move away from home and unencumbered by other family duties, some older workers may in fact want to increase hours worked. Faced with changing circumstances and preferences, older workers may instead choose to leave the labor force instead if unable to adjust their number of hours and broader work arrangements.

34. Selection effects based on job types and labor supply preferences likely explain the positive association between full-time work and continued employment uncovered by the M-Logit analysis. The positive effect of full-time employment on the likelihood of remaining employed, controlling for other characteristics, likely reflects labor market attachment and job quality. Full-time employment is generally associated with greater job stability, lower unemployment risk, and higher earnings. Meanwhile, although part-time work for older workers may be a way to ease the path to retirement and maintain attachment to employment for longer, several channels may link it to earlier labor force exit instead. First, workers with a preference for fewer hours may also have a higher propensity to leave the labor force altogether. Second, if the part-time arrangement is not voluntary, workers may also be more likely to become discouraged and leave the labor force. One caveat from this analysis is that the ECV does not differentiate between those who

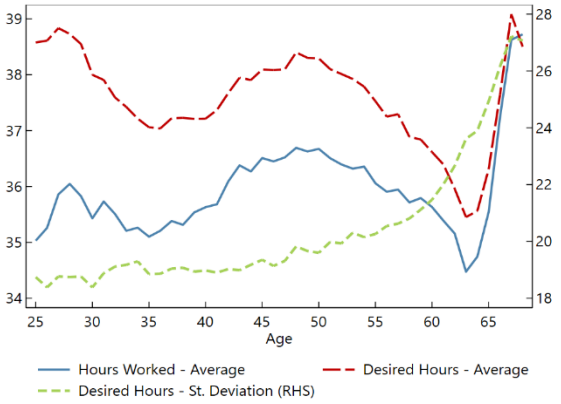
are voluntarily in part-time jobs versus those who are not. However, the EPA contains information on workers' effective and desired weekly hours, allowing for further analysis of their evolution among older workers.

35. The paths of average effective and desired hours worked from ages 50 to 69 highlight the evolution of labor supply preferences at both the intensive and extensive margin as workers get older. Figure 13 shows that average hours worked and desired hours start declining at age 50 until age 64, with a narrowing gap between the two. The decline in average weekly hours worked over this interval mostly reflects a widespread shift in workers' preferences towards a shorter work week, as suggested by the steeper decline in desired hours. The convergence between the two averages also comes with falling mismatch between effective and desired hours for individual workers, which is reflected in a falling share of workers not satisfied with their number of hours (Figure 13, right panel). Finally, starting from age 65, average effective and desired hours both rise steeply, and the gap between the two closes. This sharp change, joint with a continued fall in the share of workers unsatisfied with their hours, suggests that those who continue working into their late 60's have a strong preference for full-time employment. Finally, as workers get older, preferences for hours worked also become more diverse. Throughout the age range 50-69, the standard deviation of desired hours rises by almost 50 percent, suggesting that workers' preferences (among those who remained employed) become more and more heterogeneous (Figure 13, left panel). In other words, while on average older individuals prefer reducing their work weeks by 2 to 3 hours relative to 50-year-olds, some of them continue to desire full-time employment while others seek significant reductions in their work time.

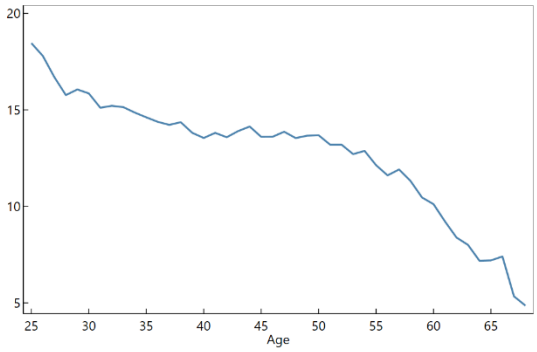
36. Flexibility in hours worked and other accommodations to older workers' needs and preference can support longer careers (Angrisani et al. 2020). Figure 14 (left panel) shows that broad occupation groups (using the 1-digit ISCO-08 aggregation) with higher shares of voluntary part-time employment among those aged 55 and above also have higher average retirement ages. This association is particularly strong for some lower-paying jobs, such as "elementary occupations" and "services and sales" ones, where hours flexibility might be traded off against lower compensation. Meanwhile, managers are the main exception, showing both high retirement ages and low incidence of part-time work. In fact, this and some other types of jobs, other factors may be driving long careers. In this regard, Acemoglu et al. (2022) construct a composite index of the "old-age friendliness" of occupations, which captures multiple features aligned with older workers' preferences, including flexible work, reduced job stress, less demanding cognitive and physical activities, shorter commuting times, and the opportunity to telework. Hence, occupations may be overall old age-friendly by having distinct combinations of characteristics that are conducive to old-age employment. Figure 14 (right panel) finds a positive association between this composite index and average retirement ages across occupations in Spain.

Figure 13. Effective and Desired Hours Worked

Effective and Desired Weekly Hours
(average, standard deviation)



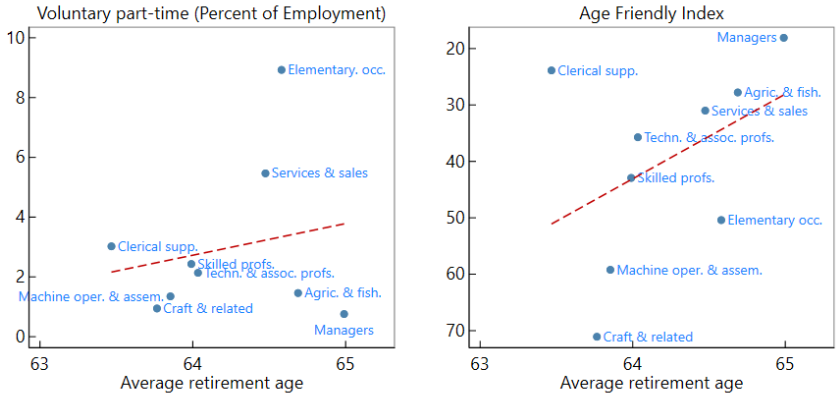
Workers Whose Hours Differ from Desired Amount
(percent of employed workers)



Sources: EPA and IMF staff calculations.
Note: the left plot reports the average effective hours worked and desired hours worked by age, and the standard deviation in desired hours worked. The right plot reports the share of employed workers whose weekly hours worked in the reference week were either higher or lower than the desired amount.

37. These results point to the importance of policies that allow for a better matching between workers and their desired hours and work arrangements. Encouraging greater labor force participation of older workers implies establishing a regulatory framework and providing incentives for firms to accommodate their diverse preferences. This can be achieved by adjusting hours within workers' current roles but also by enacting policies that facilitate transitions to jobs that better align with desired hours worked and other desired job characteristics. To this end, greater labor mobility in older ages could be fostered through training programs to help older workers acquire the skills needed in other occupations, thus facilitating their career transitions and continued labor market attachment.

Figure 14. Average Retirement Age and Job Features by Occupation
(percent of employment, inverted index value)



Sources: EPA, O*NET, Acemoglu et al. (2022), and IMF staff calculations.
Note: A lower value of the Age-Friendly Jobs Index from Acemoglu et al. (2022) indicates age-friendlier jobs (the y-axis is reversed).

38. Recent initiatives to make it easier to combine pension benefits with reduced work schedules are a step in the right direction, but they could be expanded. Measures approved in December 2024 (RDL 11/2024) increase the flexibility in combining work earnings and pensions benefits to allow a more gradual reduction in working hours for older workers through "partial" (early) retirement and "active" (delayed) retirement schemes. Although these measures go in the right direction, further improvements in the flexibility of the partial retirement option could be achieved by eliminating the requirement for the worker's employer to introduce a "replacement" worker to compensate for the reduced hours (with the commitment to convert the contract into a full-time open-ended one). While this requirement aims to avoid the misuse of the partial retirement option as an employment-reducing mechanism, it also makes workers' personal decisions subject to firms' needs and long-term plans.

Unemployment Benefits and Social Support Schemes

39. Unemployment support programs must balance providing a safety net and incentivizing older workers' return to work. Unemployment benefits (UB) in Spain include both contributory unemployment insurance (UI, *prestación por desempleo*) and non-contributory unemployment assistance (UA, *subsidio por desempleo*). Depending on years of contribution, UI benefits can last up to a maximum of 24 months. After finding a job, recipients may also continue to combine work income with benefits for 6 months.[11] UA is means-tested and accessible after the expiration of the earnings-linked UI. For those aged 52 and above, UA has unlimited duration and comes together with social security contributions of 125 percent of the minimum contribution base.[12] For younger workers, the program has limited duration (from 4 to 24 months) and does not include contributions. While the greater generosity of UA provides an extra insurance against poverty at older ages, some studies have found that it can also reduce the job search incentives of older workers, especially among those with low potential earnings (Domènech-Arumí and Vannutelli, 2023; Arranz and García-Serrano, 2023).

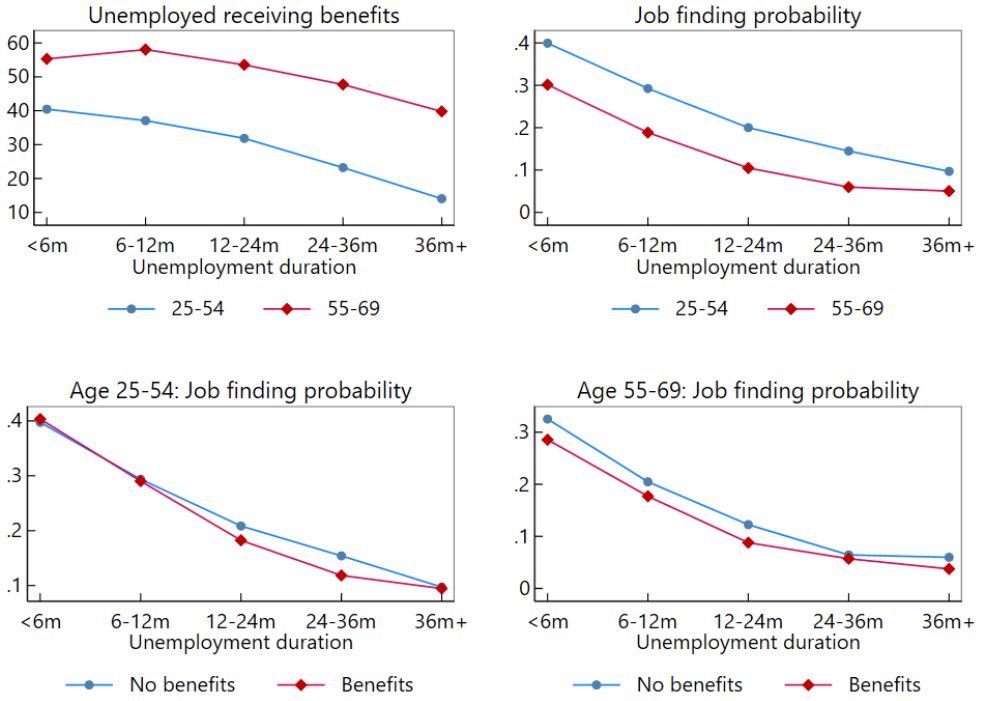
40. Older unemployed workers are more likely to receive UB and for longer, while also facing markedly lower re-employment prospects. The share of the prime-age unemployed receiving either UI or UA decreases steeply with the duration of the joblessness spell (Figure 15, top left panel). By contrast, for the 55+ it has a hump-shaped profile. Hence, a large gap in benefit coverage between older and prime-age workers of approximately 30 percentage points emerges among the long-term unemployed. This difference in coverage likely results from the longer contribution histories of older workers as well as the unlimited duration of the old-age UA scheme. At the same time, the job finding rate of older unemployed workers is approximately 10 percentage

[11] Until 2024, the ability to combine UI with employment income, known as *complemento al empleo*, was only available to those in part-time employment. A reform approved in 2024 is set to loosen those requirements starting in 2025.

[12] This age threshold has changed over the years, being raised from 52 to 55 years in 2012 and subsequently lowered to 52 in 2019.

points lower than that of the prime-aged at all unemployment durations, suggesting more limited re-employment prospects across the board (Figure 15, top right panel).

Figure 15. Spain: Unemployment Benefits and Job Finding Probability by Age and Duration of Unemployment
(percent of unemployed, probability)



Sources: EPA and IMF staff calculations.
Note: Unemployment benefits include both Unemployment Insurance (*prestación por desempleo*) and Unemployment Assistance (*subsidio por desempleo*). Job finding probability defined as the number of workers transitioning from unemployment to employment between two quarters as a share of previous quarter unemployment.

41. Receiving unemployment benefits is associated with slightly lower job finding rates, particularly at longer durations (Figure 15, bottom right panel). This contrasts with the absence of gap in the job finding probability of recipients and non-recipients among the prime-age unemployed at short durations, and its very small magnitude at longer durations (Figure 15, bottom right). While this finding does not control for workers' observed characteristics and sorting along unobserved characteristics among benefits recipients, it is in line with other studies. For instance, using regression discontinuities around the 2012 reform of the age threshold for UA eligibility, Domènech-Arumí and Vannutelli (2023) find that the unlimited duration of UA for those aged 55 and above reduced incentives to return to work.

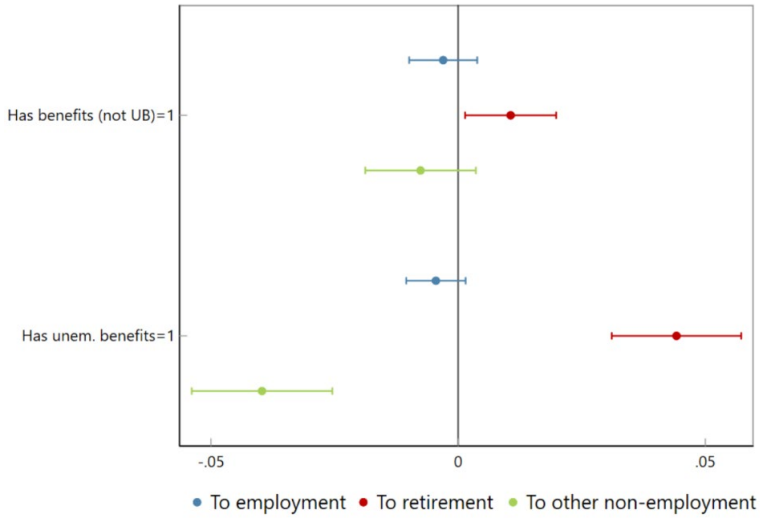
42. An extended specification of the M-Logit model provides further nuance on the role of social support programs, distinguishing between unemployment support and other social assistance benefits. The results in Section C also found that the non-employed receiving benefits have a higher likelihood of retiring while their re-employment effects were smaller. An alternative model (Figure 16) expands this result by separating income support beneficiaries into those receiving unemployment benefits and those receiving other schemes such as disability, sickness, or

family assistance. Importantly, the latter may be set at the household level and may also be means-tested, sometimes implying a trade-off between working and receiving such benefits. Furthermore, given that the analysis is done using 2010-2023 data, some of these benefits may be different from the kind of support that is being rolled out today under the progressive establishment of the Minimum Basic Income (*Ingreso Mínimo Vital, IMV*)

43. Receiving UB is associated with lower re-employment probabilities for older workers to a larger degree than other types of support. Figure 16 shows the marginal effects of both types of benefits from the multinomial logit model for transitions out of non-employment. Receiving UB increases the probability of retiring in the next period by more than 5 percentage points, while for other benefits this increase is closer to 1 percentage point. These findings imply that older workers may smooth their transition to retirement through the benefits system, with unemployment benefits being used as a *de facto* early retirement scheme, in particular. Hence, there is room for strengthening the job search incentives of UI and UA benefit recipients. The 2024 UA reform was a step in the right direction by allowing recipients to combine benefit receipt with employment earnings for a period of 6 months. This earnings complement (*complemento de empleo*) reduces the so called "participation tax rate" (PTR), defined as the reduction in earnings resulting from the loss of support benefits after returning to work. The PTR can be particularly high for low-pay work, thus creating stronger disincentives for those with the lowest labor market prospects (Coady et al., 2021). Strengthening activation requirements among UA benefit recipients and allowing them to combine benefit receipt with labor earnings for longer could amplify the employment impact of this reform.

Figure 16. Average Marginal Effects of Benefit Recipience on Labor Market Transitions of the Non-Employed, by Type of Benefits

(change in probability of transition)



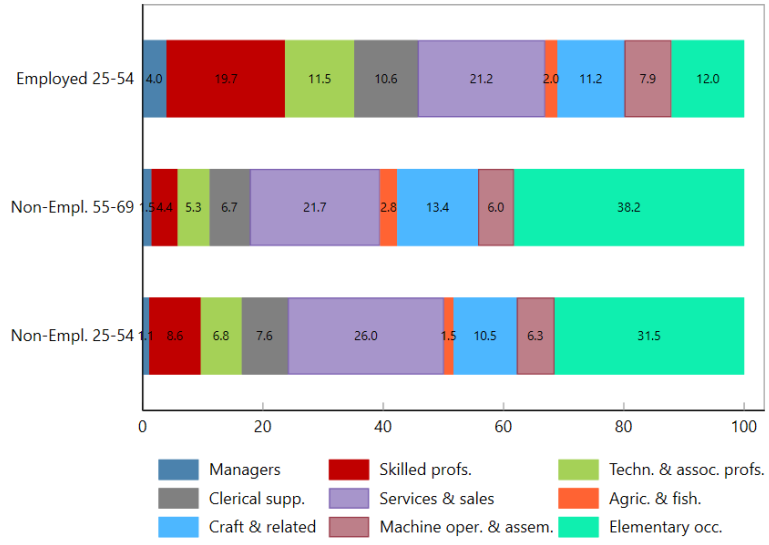
Sources: ECV and IMF staff calculations.
Note: Average marginal effects from a multinomial logit model as in section C, now splitting the dummy for receiving any benefits into those receiving unemployment benefits and those receiving any other benefits. Original state: non-employment. The non-UB benefits may be sickness, disability, social assistance or family support assistance. The bands represent 95 percent confidence intervals.

44. Beyond the design of UB and UA schemes, addressing other structural drivers of the age-based gap in re-employment prospects would help increase the old-age employment rate substantially. As computed in Barrela et al. (2025), the mechanical impact on the employment rate of older workers from closing the job finding rate gap between benefit recipients and non-recipients could be only 0.1 percentage points. Meanwhile, equalizing the job finding rate of older workers to

to prime-age job seekers, or by sectoral and occupational mismatch with respect to labor demand. Figure 17 compares the composition of employment by broad occupation groups to that of job seekers' last occupation prior to unemployment. The composition of past employment for older jobless workers is less aligned to that of the employed labor force than for younger job seekers, with a greater skew towards lower-wage occupations. For instance, more than 38 percent of unemployed older workers were previously in elementary occupations, compared to 31 percent of those aged 25-54, while elementary occupations account for only 12 percent of overall employment.

Figure 17. Occupational Distribution of Employed and Non-Employed Individuals, Prime-Aged and Older

(percent of unemployed workers)



Sources: EPA and IMF staff calculations.
Note: Each colored section within the horizontal bar represents the share of individuals in that occupation among the total employed (first row) or non-employed (bottom rows). For the non-employed, the occupation is defined as the occupation in their last job. Information on past occupations is only available for individuals who left their jobs less than a year prior to the reference week, therefore excluding the long-term jobless. The non-employed group excludes those in self-reported retirement. The figure is based on data from 2016 to 2024.

Conversely, the older jobless are less likely than the younger jobless to have occupied high-wage jobs (such as high-skilled and technical professions) that contribute as much as 20 percent to overall employment. To the extent that the composition of employment reflects demand, these findings suggest that older job seekers might be particularly mismatched *vis-à-vis* demand.

45. Improving the matching between older workers' skills and labor market needs requires both ALMPs for the jobless and training programs while still employed. If sectoral and occupational mismatch are more acute for older workers, ALMPs may need to emphasize career shifts by focusing on acquiring new skills or exploring new careers with similar skill needs to close the age-based gap in job-finding probabilities. ALMPs should be closely tailored to the training needs of older workers and their realistic potential to acquire new skills, matching the kind of jobs that are compatible with their other life commitments and preferences. Moreover, lower employability can be addressed at the source—that is, prior to job loss—by preventing skill depreciation and loss of human capital among the employed through enhanced lifelong training initiatives.

E. Conclusions

46. The labor supply decisions of older workers in Spain are affected by a plurality of factors. Timing of exits from employment and the timing of retirement depend on health, capacity to come back from job losses, family caring needs and ability to adjust the number of hours worked, in addition to financial incentives embedded in unemployment insurance and pension systems. These factors reflect the inherent complexity and diversity in the lives of older workers. The inability to adjust working arrangements and opportunities to their needs and skills often induce older workers to exit the labor market earlier and reach retirement via alternative pathways. Some of these reflect voluntary decisions but other times they may not be planned or intentional. Providing opportunities to accommodate their needs and preferences may thus give older workers a broader range of choices and encourage greater participation before and after the standard pensionable age.

47. Encouraging greater labor force participation of older workers requires acting on multiple fronts. Over the past decades, the progressive increase in the standard pensionable age and enhanced financial incentives for delayed retirement have been successful in extending the average length of careers. However, continued recourse to these measures may only go so far if other constraints on labor supply at older ages are not addressed. Important policy levers in this regard include improving health outcomes, adjusting labor modalities to reduced health and physical capacities, allowing greater flexibility in adjusting hours worked and other flexible arrangements (like telework), improving on-the-job training, and enhancing ALMPs for older unemployed workers, including recipients of unemployment insurance and assistance benefits.

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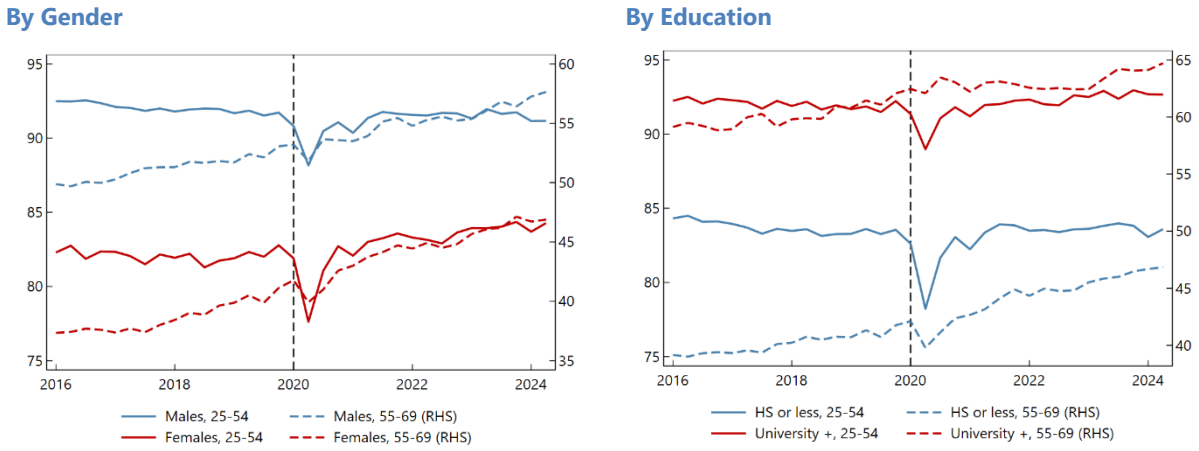
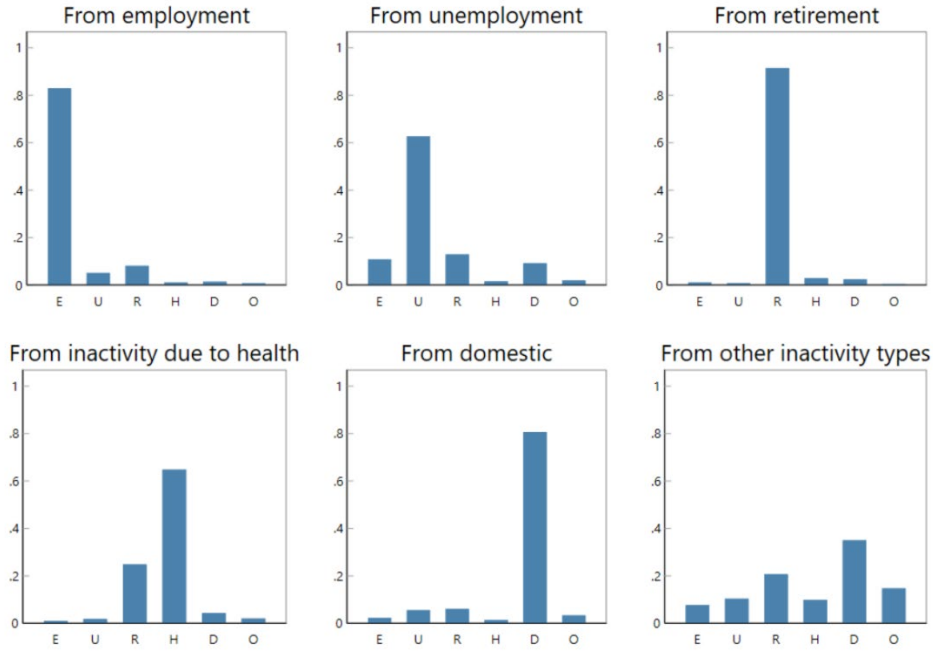
Annex I. Additional Figures

Annex I. Figure 1. Spain: Labor Force Participation Rate by Gender and Education
(percent of population)



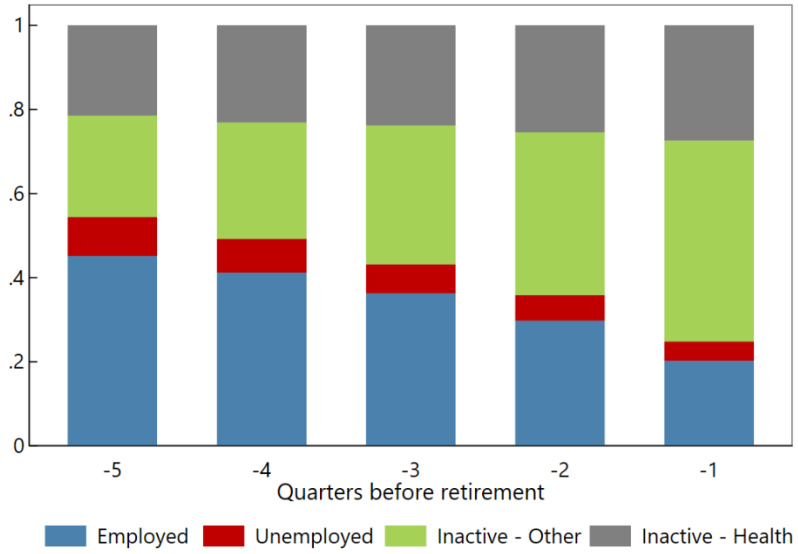
Sources: EPA and IMF staff calculations.
Note: The labor force participation rate is computed as the share of individuals who are either employed or jobless but actively searching for work (unemployed).

Annex I. Figure 2. Spain: Yearly Transition Probabilities Across Labor Market States by Initial State
(probability)



Sources: ECV and IMF staff calculations.
Note: Each panel shows transition probabilities according to the initial labor market state. E: to employment; U: to unemployment; R: to retirement; H: to inactivity due to health; D: to domestic; O: to other inactivity. Each bar corresponds to the probability corresponding to the respective destination state. For example, the first bar in the top left panel is calculated as the sum of individuals employed at *t* and employed at *t-1* over the sum of individuals employed at *t-1*.

Annex I. Figure 3. Spain: Labor Market State by Quarter Prior to Entering Retirement
(share of new retirees)



Sources: EPA and IMF staff calculations.
Note: For workers who report being retired in quarter *t* but not *x* quarters before, each bar, summing up to one, reports the composition of their labor force statuses in quarter *t-x*.

POLICIES TO ACHIEVE SPAIN'S CLIMATE OBJECTIVES[1]

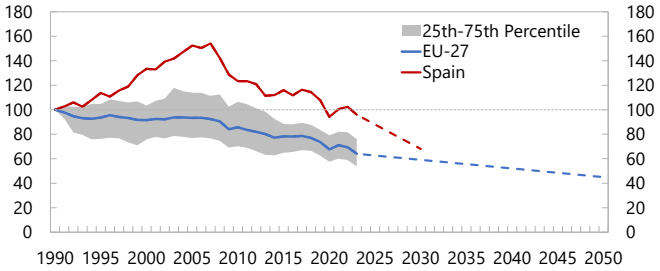
Spain has set up an ambitious goal of cutting its greenhouse gas emissions, which would imply a further cut of about 30 percent (vis-à-vis the 2023 level) by 2030. This will require new measures over and above the efforts already made. Wide heterogeneity in emission intensity across Spanish firms offers scope for further reductions in emissions through incentivizing convergence of laggards toward less-polluting peers. Doing so by relying predominantly on public spending—such as subsidies to upgrade capital or public investment—would be very costly and on its own insufficient to meet the new target. A predominant role of carbon pricing is the most effective, cost-effective and fiscally attractive option, even more so given Spain's limited fiscal space. The ongoing EU-ETS expansion could be supplemented with domestic actions to strengthen the role of carbon pricing.

A. Introduction

1. Spain significantly reduced its greenhouse gas (GhG) emissions in the past 15 years, but a further 30 percent cut will be needed to achieve the government's new, ambitious climate objectives. The government's updated 2023-2030 National Energy and Climate Plan (NECP) raised Spain's 2030 GhG-emission-reduction target from 49 to 55 percent vis-à-vis the 2005 level, and from 23 to 32 relative to the 1990 level. Despite Spain's pace of emission reduction being steady since the mid-2000s, its emissions were only slightly below 1990 levels in 2023, while those in EU-27 were already 36 percent below (Figure 1). Since 1990, the overall slower pace of emission reduction in Spain reflected improvements in both the energy intensity of economic activity (energy consumption per unit of GDP) and the emission intensity of energy (emissions per unit of energy), which have been broadly offset by the growth in population and income per capita (see details in 2022 Selected Issues). Electricity generation is the sector that has achieved the largest reduction in GhG emissions in Spain, fueled by a sharp rise in the share of renewables (reaching over 56 percent in 2024). This resulted in lower electricity costs in Spain relative to many other EU countries. By contrast, several other sectors such as agriculture and waste management have been lagging behind.

Figure 1. GhG Total Emissions

(Index 1990=100)



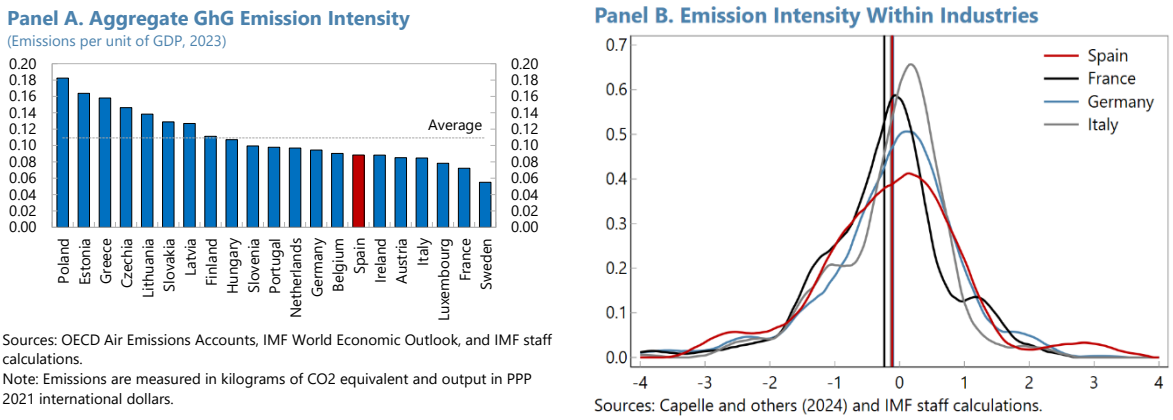
Sources: European Environment Agency (EEA) , Spain National Energy and Climate Plan, and IMF calculations.

Notes: The shaded area corresponds to the interquartile range of GhG emissions (index) within the 27 EU member countries. The last year of actual data is 2022. The numbers for 2023 are based on forecasts produced by the EEA. The numbers from 2024 onward are based on linear projections between the end-2023 values and the GhG emissions consistent with the commited emission-reduction targets set by Spain and EU-27, respectively.

[1] Prepared by Ana Lariau and Ippei Shibata (both EUR), Damien Capelle, Divya Kirti and Germán Villegas-Bauer (all RES), and Nicola Pierri (FAD).

2. While Spain's aggregate GhG emission intensity is broadly in line with its European peers, firms' emission intensities within industries are more heterogeneous in Spain than in France and Germany. Despite being the fifth largest GhG emitter in Europe, Spain's aggregate GhG emission intensity (measured as emissions per unit of output) is below the European average, and broadly in line with Germany, Italy and France (Figure 2, Panel A). Looking at the firm level, Spanish firms' emission intensity (measured as emissions over revenue) within industries is also broadly similar to that of their French, German and Italian counterparts on average, but it is more heterogeneous (Figure 2, Panel B). Spanish firms at the 90th percentile of the distribution of emission intensity within their industry emit 8 times more per unit of revenue than firms at the 10th percentile of the distribution, versus a multiple of 6 in France and 5 in Germany and Italy.

Figure 2. Emission Intensity



Sources: OECD Air Emissions Accounts, IMF World Economic Outlook, and IMF staff calculations.
Note: Emissions are measured in kilograms of CO2 equivalent and output in PPP 2021 international dollars.

Sources: Capelle and others (2024) and IMF staff calculations.

Notes: Panel B plots the kernel densities of the log of emissions intensity (measured as emissions over revenues), separately for Spain, France, Germany, and Italy, after controlling for industry × year fixed effects. The 4-digit SIC industry classification is used. Vertical lines denote means. Firms in the following sectors are excluded: (1) finance, insurance, and real estate; (2) public administration; (3) railroad transportation and local and interurban passenger transit; (4) pipelines except natural gas; and (5) electric, gas, and sanitary services.

3. This paper analyzes the factors underlying the differences in emission intensity across firms in Spain and the impact of policies to encourage emission reduction. Section B explores the drivers of firm-level emission heterogeneity and the implications for economy-wide emissions of lagging firms catching up with top performers. Section C examines the fiscal and economic impact of different climate mitigation policies using counterfactual simulations based on a multi-sector heterogeneous-firm general equilibrium model. Section D discusses policy implications and concludes.[2]

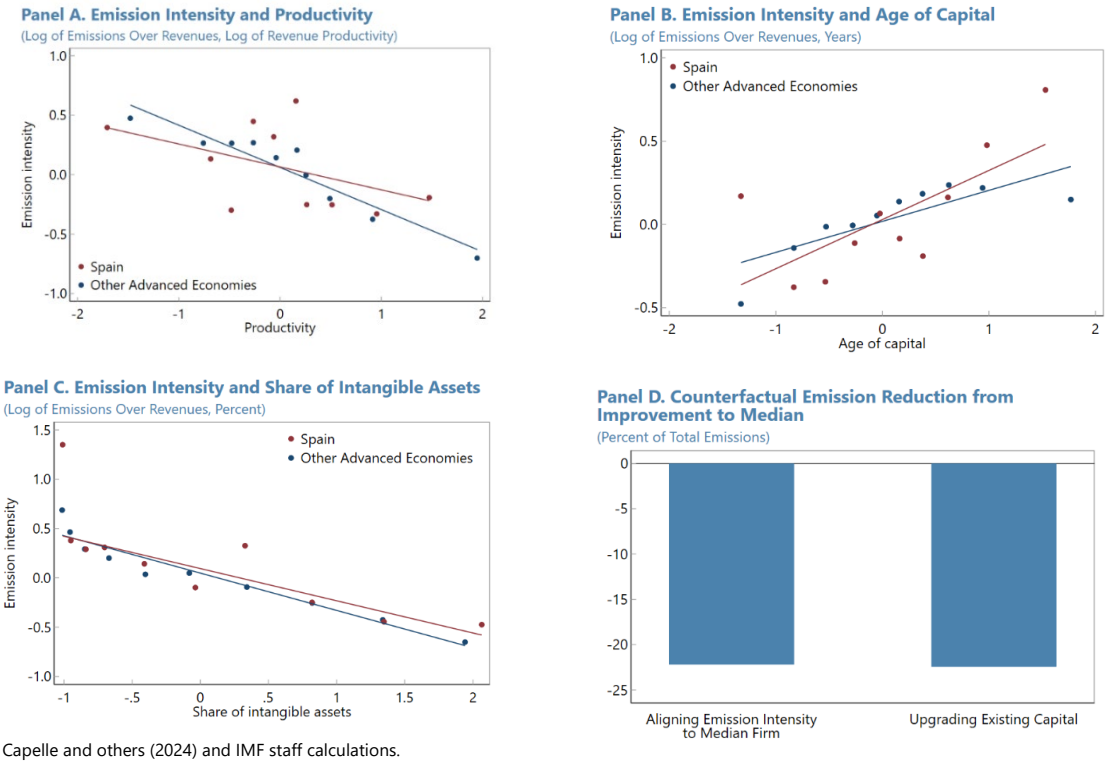
[2] Sections B and C build upon Capelle and others (2024).

B. Firm-Level Emission Heterogeneity

Data

4. The paper combines firm-level data on emissions, balance sheets, and income statements for 3,209 listed firms in advanced economies, including 48 Spanish ones over 2010-2023. Data on annual self-reported emissions at the firm level is from ICE Data Services. The focus is on CO2 equivalent (CO1eq) scope 1 (direct) and scope 2 (indirect emissions from purchased energy) emissions. Data on balance sheet and income statements is from S&P Compustat Global. As market incentives are central to the analysis of climate mitigation policies, we exclude sectors in which firms' investment decisions are primarily influenced by direct public interventions and ownership rather than market forces.[3]

Figure 3. Emission Intensity and Firms' Characteristics



Sources: Capelle and others (2024) and IMF staff calculations.
Notes: Variables in Panels A-C are standardized to have a zero mean and a standard deviation of one. The figure in Panel D illustrates counterfactual reductions in total emissions of Spanish firms in the sample if: (i) every firm with emission intensity above the 50th percentile of the emission intensity distribution within the same industry × year group saw its emission intensity reduced to that value ("Aligning emission intensity on median firm"); and (ii) every firm had at most the same age of capital as the firm in the 50th percentile age of old capital ("Upgrading Existing Capital"), where the 50th percentile is defined for the sample of firms in France, Italy, Germany, and Spain combined. Only industry × year groups with at least 2 firms are included. The 4-digit SIC industry classification is used. Firms in the following sectors are excluded: (1) finance, insurance, and real estate; (2) public administration; (3) railroad transportation and local and interurban passenger transit; (4) pipelines except natural gas; and (5) electric, gas, and sanitary services.

[3] Specifically, the excluded sectors are finance, insurance, real state, public administration, utilities, railroad transportation, and local and interurban passenger transit sectors. If these sectors were not excluded, the number of Spanish and advance economy firms would be 74 and 4,300, respectively. Results based on the entire sample, without excluding any sectors, are summarized in Annex I.

Findings

5. Achieving emission intensity convergence of lagging Spanish firms toward best practice within their industry, including by upgrading their capital, could have a major impact on economy-wide emissions. Emission-intensive firms tend to be less productive, operate with outdated physical capital, have limited intangible capital, and exhibit weaker management practices (Figure 3, Panels A-C).[4] If lagging Spanish firms were able to lower their emission intensity to the 50th percentile of the distribution across Spanish, French, German, and Italian firms within their industry, economy-wide emissions could be reduced by approximately 22 percent—i.e., nearly 75 percent of the needed 30-percent reduction to achieve the 2030 target (Figure 3, Panel D). In practice, a sizeable fraction of this potential improvement in environmental performance could be achieved by upgrading existing capital to new less energy- or emission-intensive alternatives—a process that also tends to be accompanied by output and productivity gains. For instance, Spain's economy-wide emissions could also fall by about 22 percent if Spanish firms in the bottom 50 percent of the distribution of physical capital age (across Spanish, French, German, and Italian firms) upgraded it to the 50th percentile.[5] Thus, incentivizing lagging firms to catch up with top performers could substantially reduce emissions. However, these counterfactual exercises exogenously assign emission intensities or the age of capital from greener to browner firms, holding firms' output constant. They do not consider whether such outcomes are feasible, which policies can achieve such gains, and at what cost. These considerations are explored in Section C through the lens of a quantitative model.

C. Economic and Fiscal Impact of Climate Mitigation Policies

Model Specification and Calibration

6. To evaluate the economic effects of alternative emission reduction policies, a general equilibrium multi-sector model with heterogenous firms is developed and calibrated to match Spanish firm-level data. Full details on the model are provided in Capelle and others (2024). A key feature is that firms make input purchase and investment decisions that determine their carbon emissions. In the short run, firms can adjust their variable inputs to reduce energy consumption. In the medium term, they can invest in research to improve their overall energy efficiency and increase capital intensity to further optimize energy usage. Importantly, firms can upgrade to newer capital equipment, which cuts energy use and emissions. By matching firm-level data for a range of sectors

[4] Capelle and others (2024) show that these associations are robust to comparing firms within the same industry, country and year, and to additional robustness checks. Moreover, instrumental variable results suggest a causal relationship from the age of capital and technological investments on emission intensity.

[5] Specifically, this counterfactual exercise assumes that firms whose average physical capital age exceeds the median age (7.4 years) reduce it to the median age. The estimate of the age of capital parallels the perpetual inventory method for estimating the size of capital stocks. All past investments (after accounting for depreciation) are weighted by the number of years since the investment took place, and divided by the sum of past investments (after accounting for depreciation).

in Spain and allowing for scenario analysis, the model provides a deep analysis of the potential impact of emission reduction policies on macroeconomic outcomes and firm performance.

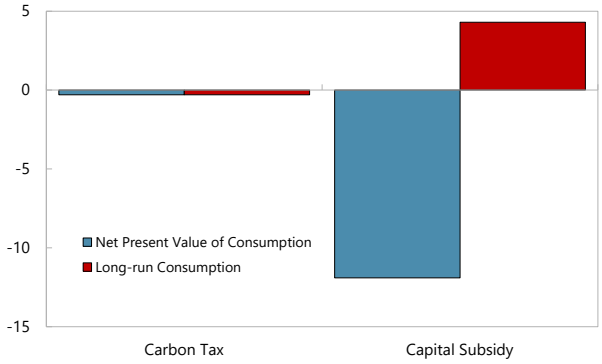
Figure 4. Economic Impact of Environmental Policy Changes

Panel A. Summary of Model Simulations

	Net Present Value of Consumption	Long-run Consumption	Fiscal Cost	Policy Instrument
	All values in % change of actual economy			
Carbon Tax	-0.3	-0.3	-0.4	$63.9
Capital Subsidy	-11.9	4.3	23.9	56.3%

Panel B. Impact of Environmental Policies on Consumption

(Percent relative to baseline in consumption)



Sources: Capelle and others (2024) and IMF staff calculations.
Notes: The model is calibrated to Spain and shows the economic impact of environmental policy changes through carbon taxes and capital susidies respectively to achieve a 15-percent reduction in GhG emissions. A 4-percent time discount factor is used to compute the net present value of consumption. Consumption values refer to the steady-state and are weighted averages across sectors, where the weights are the country-specific sector shares. The fiscal cost is the sum of the steady-state and transition net subsidies, annualized, and is in percent of steady-state GDP in the counterfactual economy. The carbon tax is expressed in US dollars.

Counterfactual Simulation Results

7. While subsidies for capital upgrades could help reduce GhG emissions, continued expansions in the scope and level of carbon pricing would achieve more ambitious targets at a lower economic and fiscal cost. The model described above is used to simulate the impact of two alternative policy tools, namely higher carbon prices and larger subsidies to newer capital vintages, each calibrated to achieve a 15 percent emission reduction compared to baseline, which is approximately half of the needed emission reduction to meet Spain's 2030 target in its latest NECP. To achieve a 15 percent reduction in GhG emissions, the carbon price in this model would need to increase by about US$ 64 per ton of CO2eq above its baseline level, while capital subsidies would need to cover over 50 cents for every dollar a firm spends on upgrading capital, which would come at a large cost to the budget and current Spanish households' living standards (Figure 4, Panel A). Using a discount rate of 4 percent, the model-based analysis implies a net present value loss in consumption of over 10 percent from relying solely on capital subsidies, while the net present value cost from higher carbon pricing would be negligible (Figure 4). More broadly, for values of the discount rate greater than 1.5 percent, the short-term fiscal cost of capital subsidies outweighs their long-term benefits in terms of increased output and productivity.[6] Furthermore, achieving large emission cuts, such as Spain's NECP target for 2030 (a reduction of over 30 percent relative to the

[6] Because capital subsidies entail large upfront economic costs and long-term gains, their adverse impact on the net present value of consumption rises with the discount rate, i.e. it is larger the less value is placed on future consumption by households.

2023 level) through capital subsidies alone is found to be unfeasible altogether, making it even more critical to rely on carbon pricing.

Caveats

8. The above analysis comes with several important caveats. First, it assumes that the current energy mix of the electricity grid is fixed and does not account for the impact of policies aimed at greening it (Domínguez-Díaz and Hurtado, 2024). Instead, it focuses solely on firms' technological and input choices given the existing grid. The analysis does not incorporate intermediate inputs and input-output linkages across sectors, which have been shown to significantly influence the effectiveness and cost of mitigation policies (Veiga Duarte and others, 2025), nor does it explore the implications of different mitigation policies on firms' competitiveness—a concern that has motivated the use of multiple mitigation instruments beyond carbon pricing. At the same time, by ignoring carbon price revenue recycling the analysis likely underestimates the economic benefits of carbon pricing compared to subsidies. Carbon pricing revenues can be recycled in ways that reduce economic distortions (e.g., through labor tax cuts), thereby lowering overall economic costs. In contrast, subsidies often require financing mechanisms that increase economic distortions, raising their overall economic cost.

D. Conclusion

9. In recent years, Spain has been moving toward achieving its 2030 climate targets through a mix of policy instruments that comprised investments, subsidies, and regulatory measures. These efforts were fueled by the implementation of Spain's Recovery, Transformation and Resilience Plan, which had about 40 percent of the Next Generation EU (NGEU) funds devoted to green investments, including renovating the building stock to increase energy efficiency, making mobility and the transport sector more sustainable, increasing the share of renewables in the energy mix, addressing biodiversity challenges, and enhancing water and waste management.[7] To provide further incentives for decarbonization in sectors not included in the European Union Emissions Trading System (EU-ETS), in 2023 Spain introduced the so-called "white certificates", which are instruments issued to companies and organizations that implement projects leading to verifiable energy savings. These certificates can then be traded on the market, allowing companies that are required to meet certain energy-saving targets (e.g., gas and electricity marketing companies, wholesale petroleum product operators, and wholesale liquefied petroleum gas operators) to purchase the certificates from those who have achieved the required energy savings.

10. Meeting Spain's new 2030 climate targets will require additional efforts, which should be centered around emission pricing mechanisms. Expanding the scope and level of carbon pricing is the most cost-effective option to reduce GhG emissions, as it would allow to reach more

[7] The Recovery Transformation and Resilience Plan is a roadmap of structural reforms and investments, established as a requirement to access funds—in the form of grants and loans—from the Recovery and Resilience Facility. This is a temporary financing instrument that lies at the core of Next Generation EU, a plan put in place in 2021 to support Europe's recovery from the pandemic, making its economy greener, more digital and more resilient.

ambitious abatement targets at a lower economic and fiscal cost than other options, which would be critical in light of Spain's limited fiscal space and the end of NGEU funding in 2026. The ongoing expansion of the EU-ETS will play a critical role but, given that the impact of carbon pricing in EU-ETS2 sectors might take time to fully materialize and free allowances under EU-ETS1 will be phased out only gradually over 2027-34, complementary domestic actions are needed to meet Spain's 2030 emission goal.[8] Domestic policy options could include raising carbon taxation in the residential and road transport sectors, encouraging the adoption of a landfill tax by more autonomous communities to further discourage waste disposal, and providing price-based incentives to optimize the use of fertilizers in agriculture. Another option could be introducing feebates in the agriculture and livestock sector, which has been done recently in Denmark and could leverage on the advanced emissions monitoring system in livestock farms currently in place in Spain. Importantly, staff analysis in this paper also suggests that, by inducing firms to upgrade their capital stock, mitigation actions could help increase productivity over time, contributing to keep the economic cost of carbon pricing low.

11. Putting in place measures that mitigate the social impact of carbon pricing would improve its political acceptability. Despite its low overall economic cost, carbon pricing can entail significant distributive impacts across industries and households that can hamper its political and social acceptability. Such concerns can be mitigated by using some of the revenues to compensate the most vulnerable and cut distortionary taxes on households and firms, with the remainder to contribute to reduce Spain's fiscal deficits. The Social Climate Plan—financially supported by the EU Social Climate Fund—is a helpful EU-level step in this direction as it will fund compensatory measures that mitigate the impact of carbon pricing on vulnerable households, micro-enterprises and transport users. Such approach could be emulated when expanding the scope and level of green taxation in Spain more specifically.

[8] The expansion of EU-ETS primarily involves broadening its scope to cover emissions from the maritime transport sector under EU-ETS1 and introducing a new ETS2 that will apply a carbon price to emissions from fuel combustion in buildings and road transport starting from 2027.

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