

Post-Pandemic Investment in Spain: Assessing the Sluggish Recovery

Nina Biljanovska

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Prepared by Nina Biljanovska*

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ABSTRACT: This paper examines Spain's investment performance five years after the COVID-19 pandemic. As of 2024, investment had only returned to pre-pandemic levels and remained below historical fundamentals and euro area peers, particularly in transport equipment and other construction. Macroeconomic analysis identifies elevated economic policy uncertainty as a factor holding back investment. Moreover, firm-level data show that investment among small and younger to middle-aged Spanish firms is less responsive to profitability than in comparable firms in larger euro area economies, further suggesting that uncertainty is weighing on investment decisions. For younger and middle-aged firms, high leverage during the pandemic also points to binding financial constraints.

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Author's E-Mail Address: NBiljanovska@imf.org

SELECTED ISSUES PAPERS

Post-Pandemic Investment in Spain: Assessing the Sluggish Recovery

Spain

Prepared by Nina Biljanovska¹

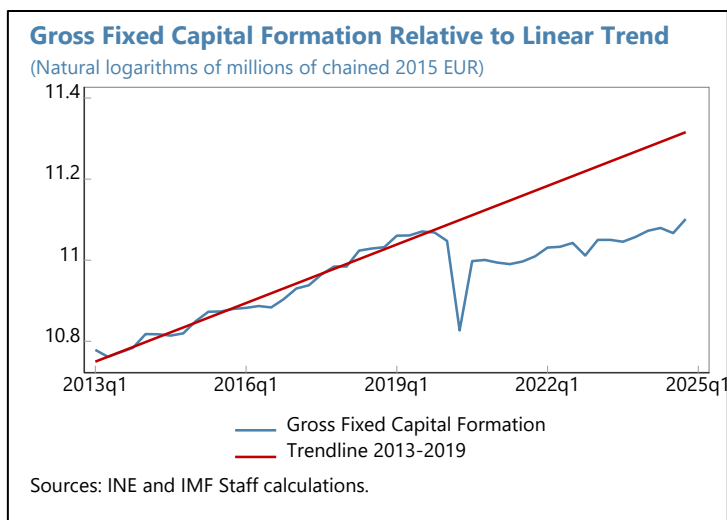
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POST-PANDEMIC INVESTMENT: ASSESSING THE SLUGGISH RECOVERY

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

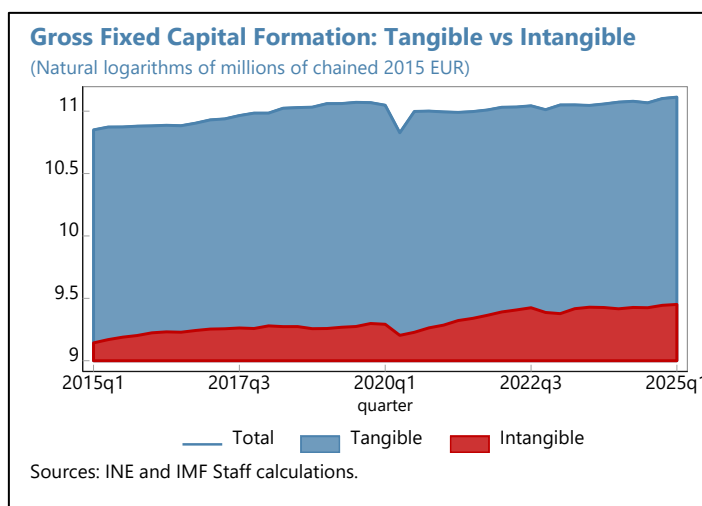
1. Investment in Spain has experienced a notably slow recovery since the COVID-19 pandemic. Nearly five years on, gross fixed capital formation (GFCF)—which captures the flow of new investment into fixed capital—has only just returned to its pre-pandemic level, despite strong real GDP growth and the 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.



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 Plan¹

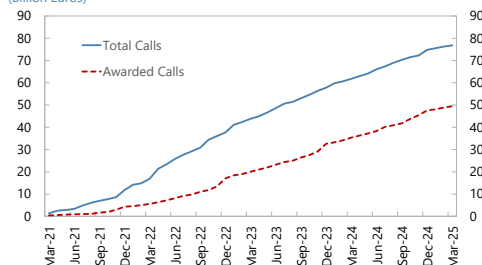
1. Since 2021, Spain has received a large inflow of funds from the Recovery and Resilience Facility (RRF) to finance investments in its Recovery, Transformation and Resilience Plan (RTRP). The envelope of €163 billion—representing about 10 percent of GDP or over half of Spain’s yearly aggregate investment—is 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

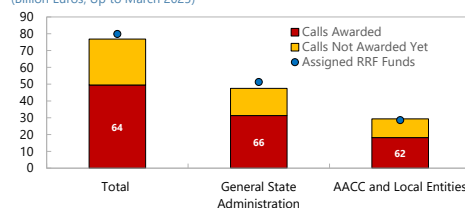
(Billion Euros)



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)



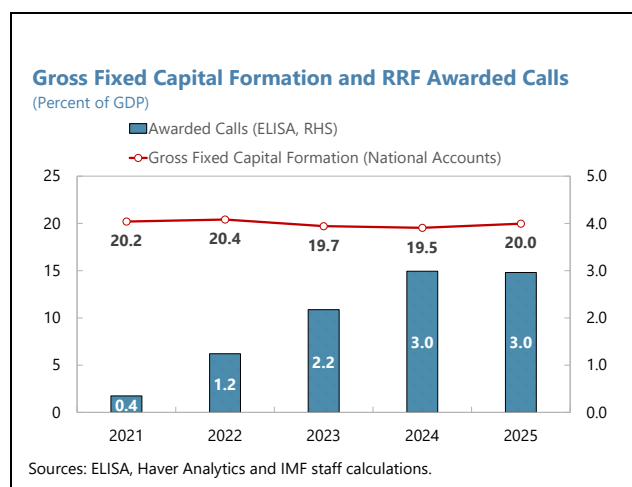
Sources: Recovery Plan Website, ELISA and IMF staff calculations.

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)

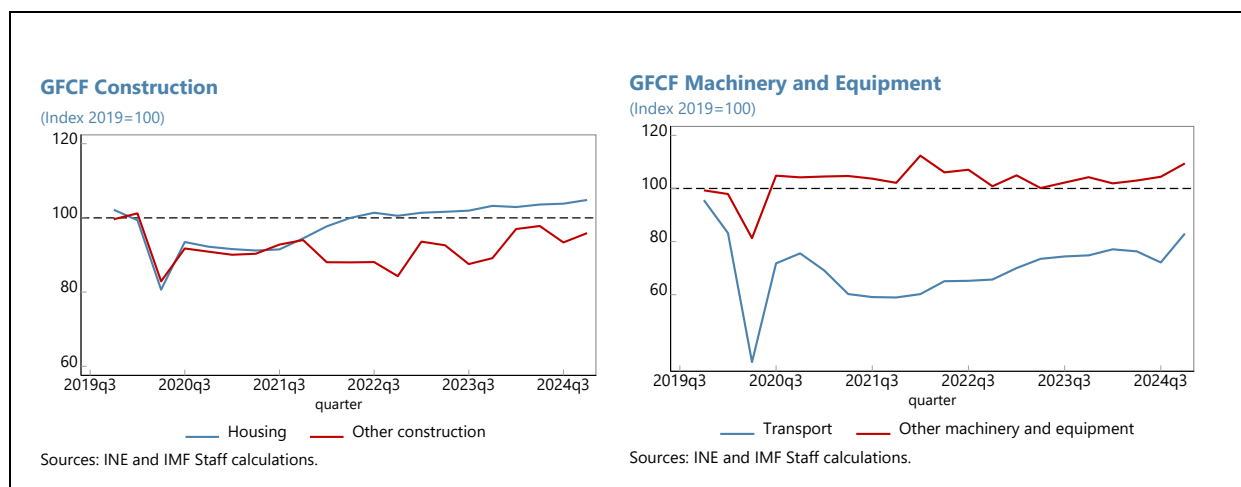
Box 1. Investment Component of the Recovery, Transformation and Resilience Plan (Concluded)

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.

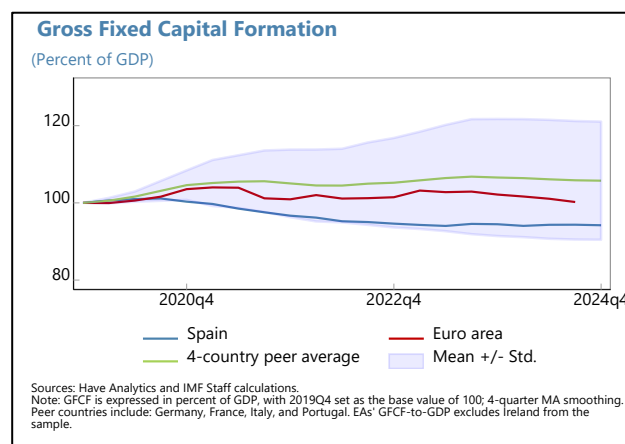


B. Recent Dynamics: Key Facts

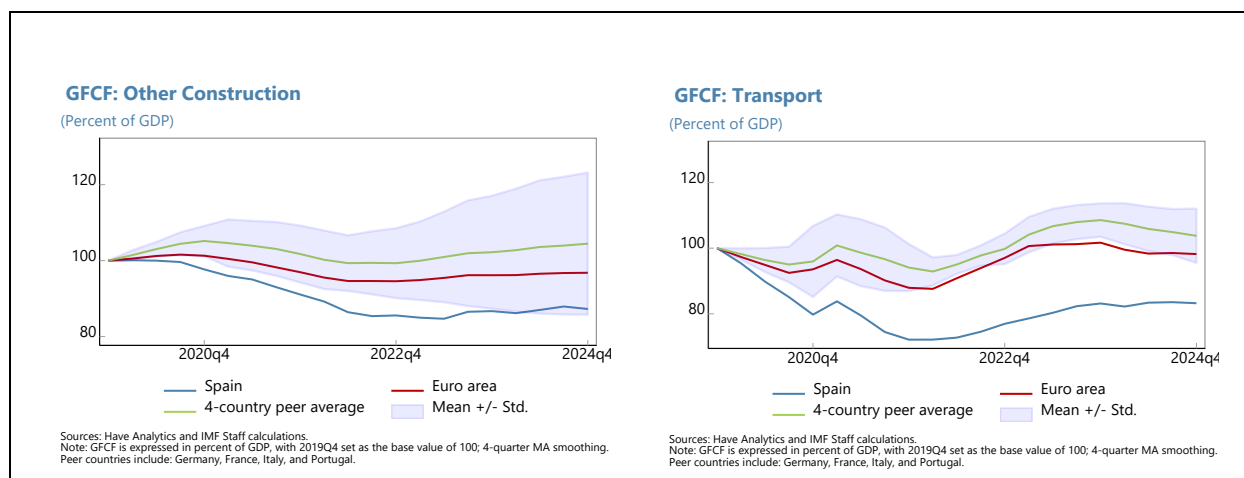
5. The recovery of investment has been weak across all sub-components, though some have underperformed more than others. Investment in transport equipment has been the weakest, remaining nearly 20 percent below its pre-pandemic level by end-2024—also noted by the [Bank of Spain \(2025\)](#). This is 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.



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.



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, compiled 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:

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

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.¹

The short-run dynamics are modeled as:

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

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 investment, particularly in irreversible or long-horizon projects. Incorporating the EPU index for

¹ 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 .

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:

$$\text{NetInv}_{cjt,t} = \beta_0 + \beta_1 \text{Age}_{cjt,t-1} + \beta_2 \ln(\text{Size}_{cjt,t-1}) + \beta_3 \Delta \ln(\text{Sales}_{cjt,t-1}) + \beta_4 \text{Profit}_{cjt,t-1} + \beta_5 \text{Markup}_{cjt,t-1} + \beta_6 \text{Leverage}_{cjt,t-1} + \text{firm}_i + \text{cty}_c \times \text{year}_t \times \text{Nace4}_j + \varepsilon_{cjt,t} \quad (3)$$

where $\text{NetInv}_{cjt,t}$ 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

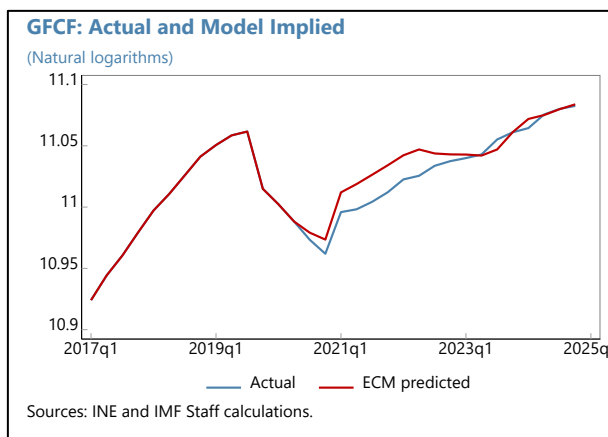
Performance of Aggregate Investment Relative to Fundamentals: Macroeconomic Analysis

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.

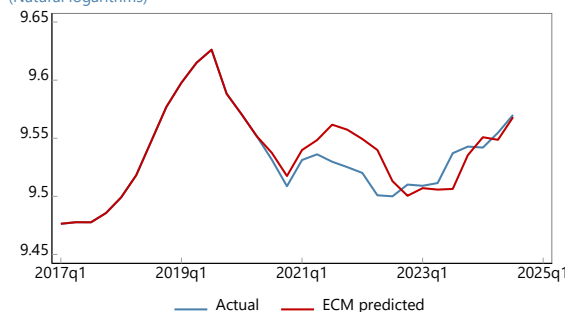
16. The investment shortfall varies across components, with machinery and equipment showing the largest deviation from fundamentals. As of

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.



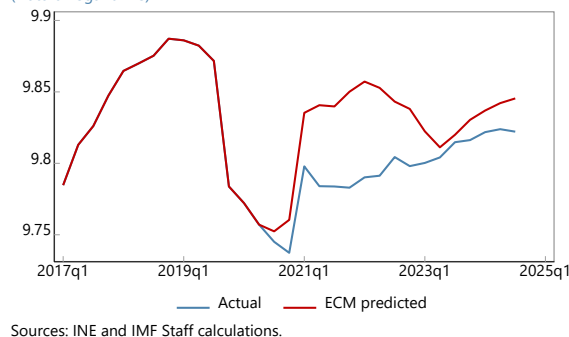
GFCF Other Construction: Actual and Model Implied

(Natural logarithms)

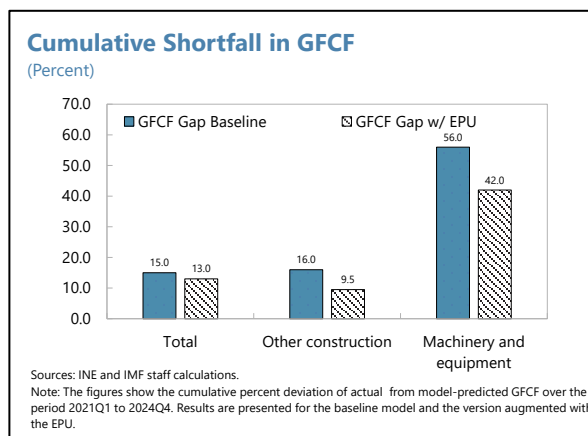


GFCF Machinery&Equipment: Actual and Model Implied

(Natural logarithms)



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.



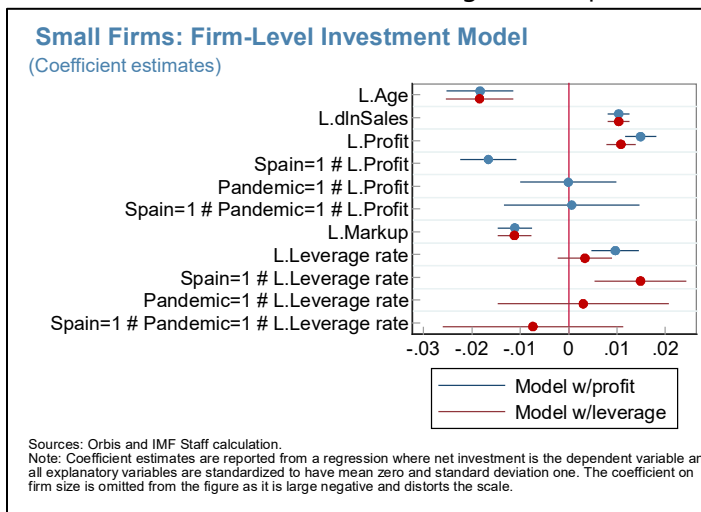
Importantly, adding EPU to the model reduces the cumulative gap between actual and predicted investment by 2 percentage points overall and by 14 percentage points for machinery and equipment, suggesting that elevated uncertainty—captured by EPU and potentially reflecting broader policy-related concerns—has 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

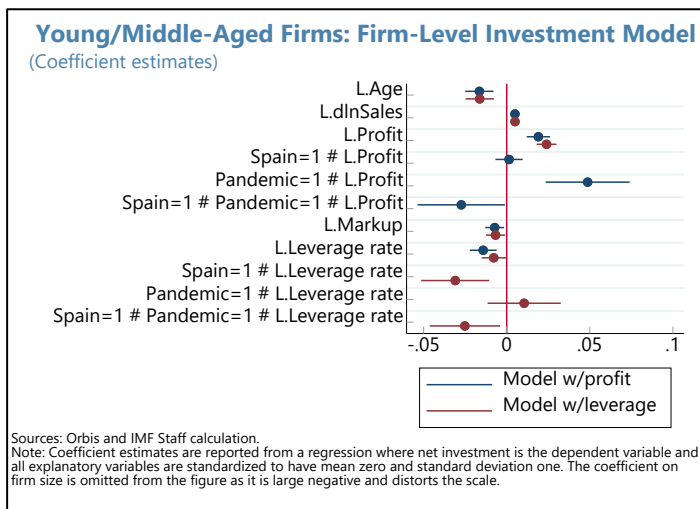
18. Net investment is shaped by a range of firm-level characteristics. Estimates from regression (3) indicate that profitability is one of the key drivers of a firm's net investment rate, consistent with the role of internal funds in financing capital expenditures. The coefficient on lagged profit is 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 Uncertainty (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)

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

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(I)	Ln(I_c)	Ln(I_m)	Ln(I)	Ln(I_c)	Ln(I_m)
Ln(Y) = D,	1.119*** (0.066)	0.919*** (0.108)	1.825*** (0.115)	1.094*** (0.067)	0.909*** (0.112)	1.762*** (0.112)
Ln(Y) = L,	-0.101 (0.135)	0.103 (0.143)	-0.201 (0.222)	-0.106 (0.136)	0.073 (0.148)	-0.260 (0.219)
Ln(Y) = L2,	-0.290** (0.138)	-0.094 (0.140)	-0.523** (0.233)	-0.333** (0.138)	-0.109 (0.144)	-0.634*** (0.231)
UCC = D,	-0.004* (0.002)			-0.004* (0.002)		
UCC = L,	-0.001 (0.002)			-0.000 (0.002)		
UCC = L2,	-0.000 (0.002)			-0.001 (0.002)		
Ln(I) = L,	0.145 (0.102)			0.127 (0.105)		
Ln(I) = L2,	0.261** (0.105)			0.278** (0.107)		
UCC (OC) = D,		-0.001 (0.004)			-0.001 (0.004)	
UCC (OC) = L,		-0.003 (0.004)			-0.003 (0.004)	
UCC (OC) = L2,		-0.002 (0.004)			-0.002 (0.004)	
Ln(I_c) = L,		0.118 (0.106)			0.129 (0.110)	
Ln(I_c) = L2,		0.212* (0.107)			0.206* (0.112)	
UCC (M&E) = D,			-0.013*** (0.004)			-0.014*** (0.004)
UCC (M&E) = L,			0.001 (0.004)			0.002 (0.004)
UCC (M&E) = L2,			-0.002 (0.004)			-0.004 (0.004)
Ln(I_m) = L,			0.035 (0.100)			0.037 (0.104)
Ln(I_m) = L2,			0.169* (0.100)			0.199* (0.102)
EPU (quartile) = D,				-0.005* (0.003)	-0.004 (0.005)	-0.005 (0.005)
EPU (quartile) = L,				-0.002 (0.004)	0.004 (0.006)	-0.012** (0.006)
EPU (quartile) = L2,				-0.000 (0.003)	0.003 (0.005)	-0.005 (0.005)
EC = L,	-0.029* (0.015)	-0.012 (0.013)	-0.142*** (0.049)	-0.050** (0.022)	-0.027 (0.019)	-0.163*** (0.057)
Constant	-0.001 (0.002)	-0.005* (0.003)	-0.001 (0.003)	-0.000 (0.002)	-0.004 (0.003)	0.000 (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) Net investment	(2) Net investment	(3) Net investment
L.Age	0.0113 (0.0136)	0.0106 (0.0135)	0.0101 (0.0179)
L.InFixed Assets	-1.024*** (0.0577)	-1.022*** (0.0580)	-1.020*** (0.0628)
L.lnSales	0.00215* (0.00122)	0.00181 (0.00124)	0.000976 (0.00165)
L.Profit	0.0429*** (0.00306)	0.0434*** (0.00298)	0.0474*** (0.00407)
L.Markup	-0.00692*** (0.00201)	-0.00709*** (0.00211)	-0.00838 (0.00514)
L.Leverage rate	-0.00766 (0.00764)	-0.00760 (0.00768)	-0.00599 (0.01000)
Constant	1.740*** (0.0775)	1.738*** (0.0781)	1.735*** (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.