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Enhancing Business Investment in the United Kingdom

Agnese Carella, Ruo Chen and Xiaobo Shao

SIP/2023/050

***IMF Selected Issues Papers* are prepared by IMF staff as background documentation for periodic consultations with member countries.** It is based on the information available at the time it was completed on June 20,2023. This paper is also published separately as IMF Country Report No 23/253.

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ABSTRACT: The paper addresses the issue of weak business investment in the United Kingdom (UK) by analyzing aggregate investment trends in the UK and other G7 peers, and investment drivers for UK firms. Data show that business investment has been structurally low in the UK, and likely the key driver of the UK's relatively weaker growth performance since the middle of the last decade. Econometric investigations confirm a negative impact of Brexit-related uncertainty, the importance of financing constraints on firms, and a complementary role for public capital.

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SELECTED ISSUES PAPERS

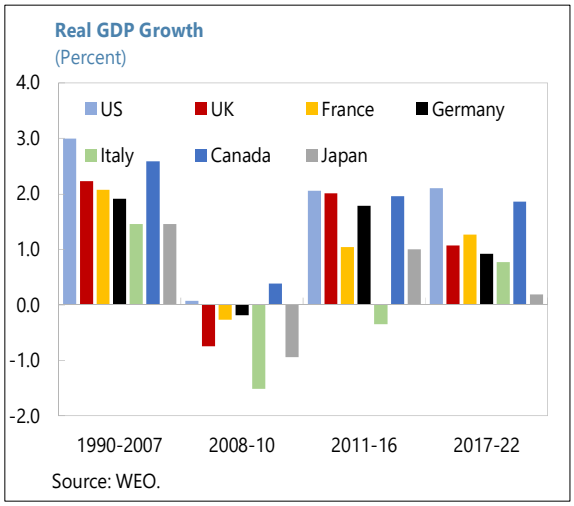
Enhancing Business Investment in the United Kingdom

ENHANCING BUSINESS INVESTMENT IN THE UNITED KINGDOM[1]

Why has business investment in the United Kingdom (UK) been weak? The paper addresses this question by analyzing aggregate investment trends in the UK and other G7 peers, and investment drivers for UK firms. Data show that business investment has been structurally low in the UK, and likely the key driver of the UK's relatively weaker growth performance since the middle of the last decade. Econometric investigations confirm a negative impact of Brexit-related uncertainty, the importance of financing constraints on firms, and a complementary role for public capital.

A. Introduction

1. There are both conjunctural and structural reasons to focus on business investment in the UK. Pre-GFC, the UK was the third fastest-growing G7 economy after the United States and Canada. But this momentum was sequentially lost, first with the GFC, then with the Brexit referendum (which saw business investment level off), and finally with the pandemic (which has been accompanied by a rise in labor inactivity). The present conjuncture, following the energy shock due to Russia's war in Ukraine, with high inflation and weak growth, therefore, provides a strong motivation for focusing on expanding the UK's supply potential, including through higher business investment. Moreover, as will be shown below, even before these events, the UK recorded a relatively low level of business investment compared with other G7 peers, pointing, potentially, to structural impediments.



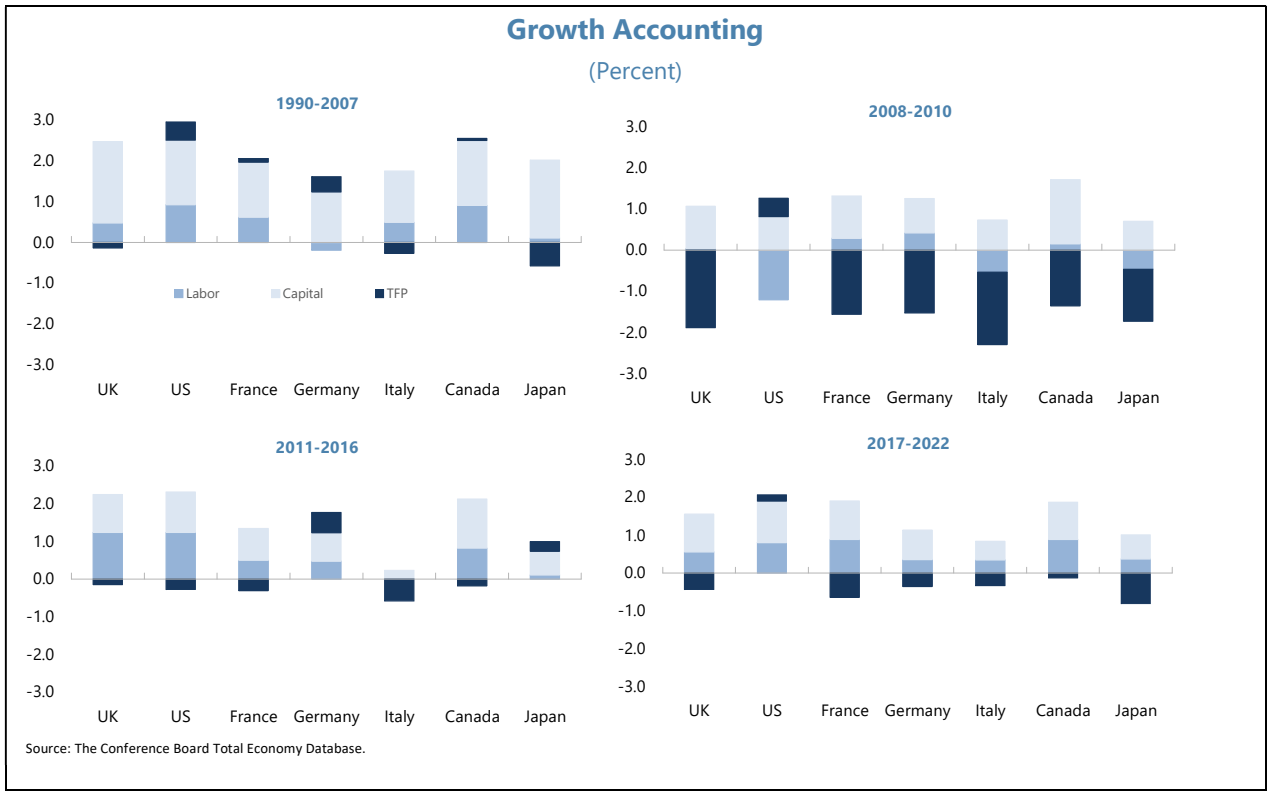
2. Against this backdrop, the paper examines patterns and drivers of UK business investment since 1990 with a view to identifying key impediments that policy could address. The paper explores various factors that could potentially influence investment decisions, such as uncertainty, borrowing costs, access to term finance, and profitability expectations of firms. The paper also examines the role of public investment in driving private investment. The empirical results then provide a basis for identifying suitable reforms. The rest of the paper is structured as follows: section B lays out some high-level trends in macro data on investment and growth, comparing the UK with G7 peers; section C sets out the econometric exercises based on a two-fold

[1] Prepared by Agnese Carella, Ruo Chen (both EUR), and Xiaobo Shao (INV).

approach, using macro and micro (firm) datasets to identify drivers of business investment; and section D discusses policy implications.

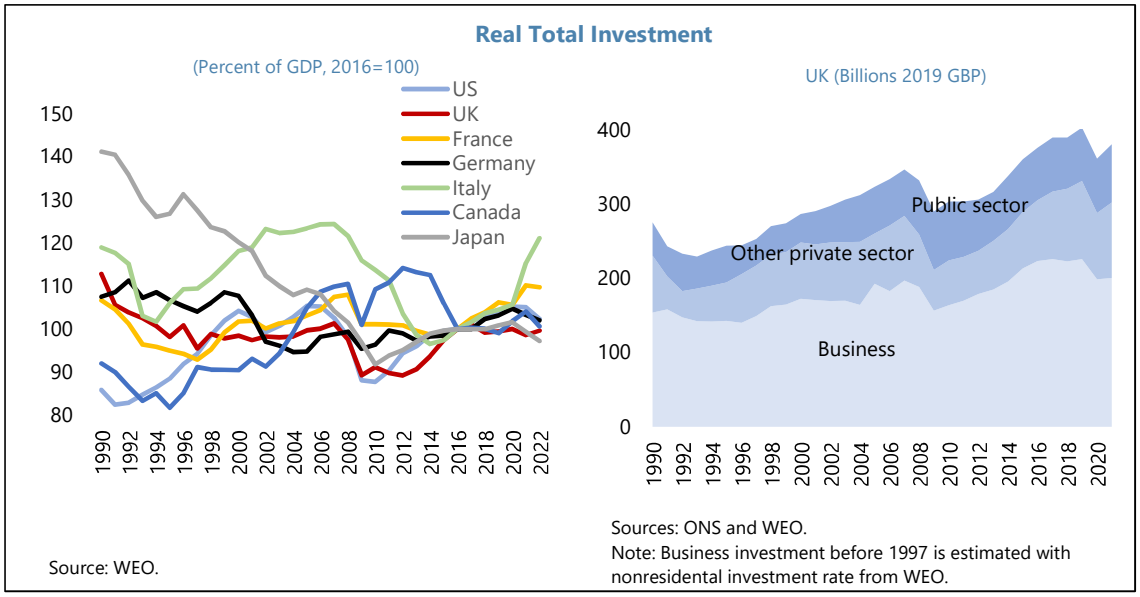
B. Level and Growth Contribution of Business Investment in the UK

3. Trends in business investment have been a key driver of UK growth performance since 1990. Capital accumulation (grey bars) in the UK was robust in the years preceding the GFC, leading the country's strong economic performance relative to other G7 economies. But the rate of capital accumulation almost halved in 2008–2010, and never fully recovered to pre-GFC levels. In fact, the post-GFC economic rebound (i.e., 2011–2016) was mainly driven by a surge in labor participation (light blue bars), aligning with trends observed in the US. In 2016, the share of labor contribution to the UK growth exceeded 50 percent, nearly triple that observed before the GFC. But, more recently, during 2017–22, the contribution of labor has declined too, in both absolute and relative terms, thus failing to compensate for the weaker contribution from capital and productivity.



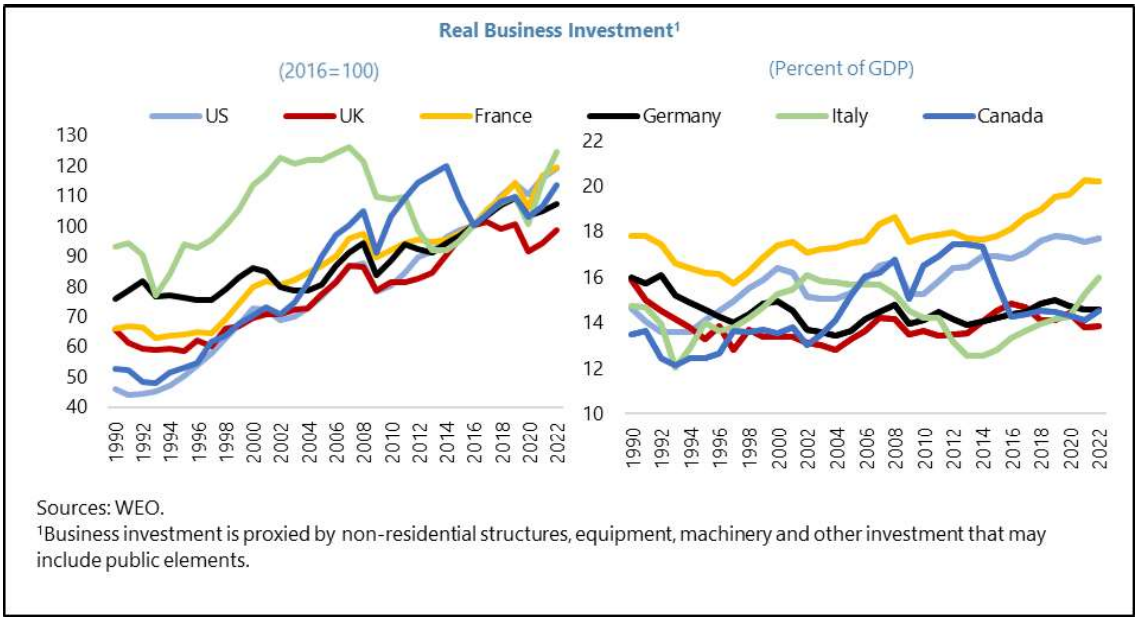
4. Business investment in the UK has been low compared to G7 peers for some time. UK total investment, as a share of GDP, has been 4 percentage points below (on average) compared to other G7 economies since 1990. Business investment, which accounts for the bulk of investment and about 13 per cent of UK GDP, has also been relatively low for long and has deteriorated further during the GFC; non-residential investment has been below the average for G7 peers by an average of 36 percent since 1990; and the same pattern emerges in percent of GDP comparisons. The post-GFC recovery in business investment was sluggish, falling behind other advanced economies; and the momentum was further disrupted after the Brexit referendum which was associated with substantial

uncertainty for businesses. Subsequently, throughout the pandemic, real business investment in the UK failed to keep pace with its peers and has settled at a slightly lower level in 2022 than in 2016 (while other G7 economies experienced a 14 percent increase on average over this period).



Source: WEO.

Sources: ONS and WEO.
Note: Business investment before 1997 is estimated with nonresidental investment rate from WEO.

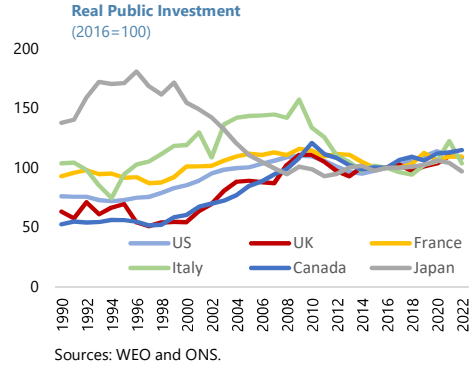


Sources: WEO.
[1]Business investment is proxied by non-residential structures, equipment, machinery and other investment that may include public elements.

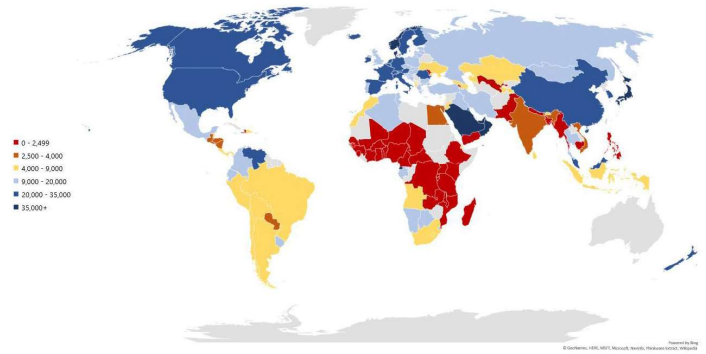
5. Low business investment (and its consequences for productivity[2]) might also reflect the UK's relatively low public investment and public capital stock. Public investment in the UK

[2] As noted in the accompanying SIP on the labor market, UK labor productivity is second-lowest in the G7.

has historically been lower than in G7 peers (left chart below). Xiao and Le (2019)[3] show that the UK stands out among advanced economies with a low capital stock (right chart below). There is a large literature on the complementarity of public and private capital and the catalyzing effect of public infrastructure on business investment, and public investment more generally on innovation and human capital (which further catalyze business investment).[4]



Sources: WEO and ONS.



Note: While the real value of the accumulated public capital stock has risen steadily on a per capita basis across countries (nearly tripled since 1960), it remains highly unequal, with a picture closely mirroring the global distribution of GDP per capita.
Source: IMF "Estimating the stock of public capital in 170 countries."

C. Drivers of UK Business Investment: Two Econometric Analyses

Fixed Effect Regressions on G7 Macro Panel Data

6. The objective of the macro exercise it to explore macroeconomic indicators that could explain differences in UK business investment with respect to other G7 countries. The following macro investment model is estimated using annual panel data for G7[5] economies, over the period 1980–2022:

$$\Delta I_{i,t} = \alpha_0 + \beta_1 X_{i,t} + \beta_2 \sum_{n=1}^{3} \Delta Y_{i,t-1} + + \beta_3 Brexit_t + \beta_4 Covid_t + \mu_t + \nu_i + \varepsilon_{i,t} \qquad (1)$$

where i denotes the country and t the year; and

- $\Delta I_{i,t}$ is the growth rate of non-residential investment[6]

[3] "Estimating the stock of public capital in 170 countries (August 2019 update)."

[4] See also "Public Investment for the Recovery" (IMF, 2020) and Huntley (2021).

[5] Japan is excluded from the analysis due to lack of data.

[6] Non-residential investment is used as a proxy of business investment. It includes non-residential structures, equipment, machinery, and other investment, which might include some public elements. Other proxies were considered based on private investment excluding residential, which yielded with similar results.

- $X_{i,t}$ is a vector of lagged macro variables: non-financial corporation debt (as a measure of credit or financing constraints), short-term interest rate (as a proxy for borrowing costs), market capitalization (to capture future profit expectations), public investment growth (to capture possible crowding-in/out effects), credit to households (to control for possible crowding out effects on firms), and $\Delta Y_{i,t-1}$is the growth rate of GDP with lags up to three years (to capture the prevailing economic environment)

- $Brexit_{i,t}$ is a time dummy equal to one for the UK during 2017–2022 (to capture the uncertainty effect following the Brexit referendum) and $Covid_{i,t}$ is a time dummy equal to one after 2019.

- μ_t and ν_i are time and country fixed effects, respectively, and $\varepsilon_{i,t}$ is the idiosyncratic shock.

Data are from the World Economic Outlook, the Bank for International Settlements, the National Statistics, and the World Federation of Exchanges. The variable definitions are provided in Table 1.

7. Table 3 shows the results from the macro panel regression on equation (1):

- Column (1) indicates that business investment is inversely related to lagged **non-financial corporate debt** (as a share of GDP): high levels of debt create financial constraints and limit the firm's ability or willingness to secure additional financing for investment purposes (ECB, 2023). On the other hand, the coefficient on the aggregate interest rate is not significant, which suggests that the level of interest rate in the economy by itself may not be a major deterrent to investment.

- Moreover, business investment is positively associated with firms' growth expectations, as reflected by **market capitalization.** The positive market sentiment, from investors placing a higher value on future earnings potential, provides firms with greater access to fundings and incentives to optimize resource allocation (Baker et al., 2003; Leitner, 2007).

- Column (2) examines the complementarity between public and private capital and finds a positive relationship. The coefficient on **public sector investment** is positive and significant, corroborating the hypothesis of a crowding-in effect and the narrative that government spending, especially on public good and infrastructure, can serve as a catalyst for stimulating private sector activity and fostering sustainable economic growth[7] (Xu et al., 2014; World Bank, 2007; Commission on Growth and Development, 2008; IMF, 2010, 2020; Huntley, 2021).[8]

- Column (3) accounts for the role of **Brexit-related uncertainty,** controlling for the potentially conflating effects of the Covid pandemic. A prolonged period of uncertainty followed the 2016

[7] A 10-percentage point increase in public investment growth would correspond to a nearly 1 percentage point increase in business investment growth.

[8] Note that earlier studies on the relationship between public investment and growth have not provided definitive results (IMF 2004 and IMF 2005), and some have concluded that public investment is neutral (Aschauer, 1989) and that growth disparities are better explained by total factor productivity, rather than capital accumulation (Easterly and Levine, 2001).

referendum that lasted until December 2020, when a deal was eventually reached with the EU. Over this period, the lack of clarity regarding post-Brexit trade relationships with the EU created a challenging economic context, which was further compounded by disputes over the Northern Ireland Protocol and the retention of EU laws. According to the recent literature, the instability and potential disruptions associated with this have generated a large and long-lasting increase in uncertainty, and a less favorable business environment in the UK, which has led to cautious investment behavior and subdued capital spending (Górnicka, 2018; Bloom t al., 2019; Anayi at al., 2021; Faccini and Palombo, 2021). Traditional policy uncertainty indicators (such as Bloom's 2013) fail to capture this effect, as they do not show persistence beyond 2016. Instead, the paper adopts a time dummy for UK in the years after Brexit. Consistent with this, the coefficient on the Brexit uncertainty dummy is found to be negative and statistically significant. Moreover, business investment was found to further deteriorate during **Covid;** although the Covid dummy was insignificant, the year fixed effect for 2020 had a negative significant coefficient.

Micro-econometric Analysis Using Firm-level Data

8. The microeconomic investment model is estimated using annual firm-level panel data for a sample of about 5,000 UK listed companies over the period 1984–2022. Following IMF (2014), the estimation methodology is based on the GMM-System estimator proposed by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998). The GMM-System estimator addresses potential endogeneity issues and measurement errors in autoregressive models with high persistence (frequently seen in firm-level panel data) by using lagged explanatory variables as instruments. The model specification loosely follows the choice of variables in the previous exercise plus some additional, as follows:

$$\frac{I_{i,j,t}}{K_{i,j,t-1}} = \gamma_0 + \delta_1 \frac{I_{i,j,t-1}}{K_{i,j,t-2}} + \delta_2 \mathrm{Z}_{ijt-1} + \delta_3 Brexit_t + \delta_4 Covid_t + \tau_t + \eta_i + \varphi_j + \omega_{ijt} \qquad (2)$$

where i denotes the firm, j the industry, and t the year. $\mathrm{I_{i,t}}$ is capital expenditure, $\mathrm{K_{i,t}}$ is net capital stock, $\mathrm{Z_{i,t}}$ is a vector of controls, including annual sales growth relative to historical mean, return on assets, the effective interest rate, retained earnings and long-term capital. $Brexit_{i,t}$ is a time dummy equal to one after 2016 (Brexit referendum), $Covid_{i,t}$ is a time dummy equal to one after 2019; τ_t , η_i and φ_j are time, firm and industry fixed effects, respectively, and ω_{ijt} is the idiosyncratic shock. Data are from the Worldscope database. The variable definitions are provided in Table 2.

9. Table 4 presents the micro regression results from equation (2).

- The coefficient on **sales growth** is positive and statistically significant, as firms are more inclined to invest when they anticipate higher prospects for final demand.
- The coefficient on the **return on assets** is also positive as expected, indicating that profitability provides firms with the necessary resources, confidence, and competitive advantage to invest more.

- The coefficient on the **effective interest rate** faced by firms is negative and statistically significant, as expected, suggesting that higher borrowing costs reduce the desired stock of capital among firms. Moreover, firms with higher levels of **retained earnings** are more likely to engage in investment activities, in line with the pecking order theory of prioritizing internal financing over external debt and equity financing (Myers,1984) and with recent empirical evidence for the UK (McCafferty, 2014).

- External financing continues to play a significant role, nonetheless (IMF, 2014; EC, 2014). The coefficient on **long-term debt** is positive and statistically significant, meaning that UK firms with higher access to long-term financing undertook higher investment.

- Column (2) investigates the impact of **Brexit** (as before proxied by a time dummy for the Brexit referendum) on investment decisions of UK firms, controlling for Covid confounding effects. Findings confirm a substantial decline in business investment following Brexit, which persists after accounting for industry variation and the detrimental impact of the subsequent **Covid** pandemic shock (the Covid dummy had a negative and significant coefficient). The result is in line with the prevailing narrative that both the UK's decision to leave the EU and the Covid pandemic have generated an unexpected, large, and persistent uncertainty shock, as well as a scenario characterized by businesses caution and reluctance to commit to long-term investment projects (Bernanke, 1983; Arellano et al., 2018; Bloom et al, 2019; Anayi at al., 2021).

- Column (3) investigates **industry patterns.** By including industry fixed effects, the analysis allows to rank sectors based on their investment levels and to identify the high-investment ones. Findings reveal that firms operating in specific sectors, specifically advanced manufacturing, transportation, communications, health services, education, and research and development, tend to have higher levels of investment, which might be indicative of greater dynamism.

D. Main Results and Policy Implications

10. The main findings of the econometric analyses are as follows. First, Brexit-related uncertainty appears to have been a key driver of low business investment after 2016, and the pandemic has added further to the drag. Second, there is a significant crowding-in effect of public investment on private investment. It is noteworthy that this result obtains over a sample period (1980–2022) where G7 government yields averaged over 5 percent. Third, UK firms with higher retained earnings or external long-term capital have been able to invest more. Thus, access to finance matters. Fourth, certain sectors are more dynamic in terms of investment (such as advanced manufacturing, health, education, transport, communications, R&D). Although it is not clear whether these sectors would continue to be leading investors going forward, or how productive their investments would be, continued attention to addressing market failures in these and other sectors appears warranted. Fifth, high levels of firm indebtedness constrain investment; this may be less of a concern today, as non-financial corporate debt is significantly below its pre-GFC peak.

11. The UK authorities are taking measures to address some of the inhibitors to UK business investment identified above. The Windsor Framework agreement with the EU and the

more measured approach to reviewing retained EU laws, should help reduce Brexit-related uncertainty. On public investment, while the last two budgets have sought to protect near-term investment spending, the public investment-to-GDP ratio is still set to decline after 2025. On access to finance, the authorities are seeking options to unlock the UK's large pool of pension and insurance savings to finance high-return investments. Finally, the Chancellor's 4Es strategy (focusing on enterprises, education, employment, and everywhere) seeks to target high-productivity growth areas, such as advanced manufacturing, life sciences, and clean energy; and the three-year capital allowances introduced in the 2023 Spring budget seek to remove tax as an obstacle to investment.

12. Additional reforms should build on these steps. First, although recent developments related to post-Brexit uncertainty have been encouraging, these need to be consolidated, including through timely implementation of the Windsor Framework and careful review of retained EU laws. Second, accelerating well-targeted public investments (e.g., for the green transition and the delivery of network and healthcare infrastructures) can lower costs for businesses and crowd-in private investment. Third, firms' access to external finance (ideally equity capital) could be enhanced by unlocking pension and insurance savings.[9] However, any reform in this space should not undermine financial stability. Fourth, improved R&D incentives, permanent (and broader) capital investment allowances, and measures to alleviate skills shortages can address market failures and fuel expansion in new industries and technologies.

Table 1. United Kingdom: Macro Variable Definitions

Variable	Definition	Source
Real non-residential investment	Sum of the non-residential structure, equipment, machinery, and other investments[1/]	World Economic Outlook (WEO)
Credit to households (%GDP) [-]	Credit to households and nonprofit institution serving households (NPISHs) adjusted for breaks through standard statistical techniques	Bank for International Settlements (BIS)
Interest rates [-]	Short-term interest rate	WEO
Outstanding debt (%GDP) [-]	Outstanding debt to nonfinancial corporations (NFC)	National statistical authorities
Public investment [+/?]	Real public investment	WEO
Market capitalization (%GDP) [+]	Stock exchange market capitalization	World Federation of Exchanges; Nikkei.

[1/] This might include public elements. For robustness, other proxied have been considered based on available data.

[9]According to ONS data financial assets of pension funds and insurance corporation in the UK amounted to 5 trillion GBP in 2022, double the size of the country's GDP.

Table 2. United Kingdom: Micro Variable Definitions		
Variable	Definition	World scope codes
Investment to capital (logarithm)	Capital expenditures as the ratio of lagged net capital stock (property, plant, and equipment)	WC04601/WC02501
Sales growth [+]	Net sales or revenues minus a firm's historical mean.	WC01001
Return on assets (logarithm) [+]	Return on assets	WC08326
Effective interest rate (logarithm) [-]	Interest expense as the ratio of total debt	WC01251/WC03255
Retained earnings to capital (logarithm) [+]	Retained earnings as the ratio of lagged net capital stock	WC03495/WC02501
Long-term capital (logarithm) [+]	Long-term debt as the ratio of lagged net capital stock	WC03251/WC02501

Table 3. United Kingdom: Real Business Investment and Macro Indicators [1/]

VARIABLES	(1)	(2)	(3)	(4)
	Business Investment Growth			
Lagged Credit to Household	-0.0734	-0.0219	-0.0322	-0.0322
	(0.0461)	(0.0609)	(0.0597)	(0.0632)
Lagged Interest Rate	-0.540	-0.383	-0.683	-0.683
	(0.449)	(0.507)	(0.516)	(0.460)
Lagged Debt to NFC	-0.101*	-0.127*	-0.139**	-0.139
	(0.0577)	(0.0648)	(0.0636)	(0.0876)
Lagged Market Capitalization	0.0286**	0.0286*	0.0247*	0.0247
	(0.0136)	(0.0147)	(0.0145)	(0.0146)
1-year lag GDP Growth	0.387	0.528	0.313	0.313
	(0.306)	(0.393)	(0.398)	(0.285)
2-year lag GDP Growth	-0.0283	0.0760	-0.129	-0.129
	(0.328)	(0.414)	(0.416)	(0.154)
3-year lag GDP Growth	-0.387	-0.726	-0.583	-0.583
	(0.414)	(0.555)	(0.547)	(0.845)
Lagged Public Investment Growth		0.0961**	0.0989**	0.0989*
		(0.0434)	(0.0424)	(0.0362)
Brexit (UK and year>2016)			-4.616**	-4.616***
			(2.217)	(0.570)
Covid (year>2019)			-0.257	-0.257
			(4.973)	(1.810)
Time fixed effects	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y
Observations	143	120	120	120
Adjusted R-squared	0.516	0.484	0.508	0.528
Room Mean Square Error (RMSE)	3.473	3.671	3.586	3.511

Column 1-3: standard errors in parentheses; Column 4: robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

[1/] Business investment is proxied by the sum of non-residential structures, equipment, machinery and other investment (which might include public elements). Other proxied were considered, based on private investment excluding residential component, which yielded largely similar results.

Table 4. United Kingdom: Determinants of Business Investment on Firm Level [1/]

VARIABLES	(1)	(2)	(3)
	Investment to 1-year Lag Capital		
Lagged Investment to Capital	0.285***	0.289***	0.288***
	(0.0270)	(0.0266)	(0.0266)
Sales Growth	0.231***	0.259***	0.259***
	(0.0707)	(0.0728)	(0.0728)
Lagged Return on Assets	0.0821***	0.0983***	0.0980***
	(0.0115)	(0.0112)	(0.0112)
Effective Interest Rate	-0.0403***	-0.0147	-0.0145
	(0.0136)	(0.0132)	(0.0132)
Retained Earnings to Capital	0.214***	0.200***	0.199***
	(0.0114)	(0.0107)	(0.0107)
Long-term Debt to Capital	0.0791***	0.0807***	0.0806***
	(0.00750)	(0.00743)	(0.00742)
Brexit Dummy		-0.184***	-0.181***
		(0.0295)	(0.0294)
Covid Dummy		-0.431***	-0.431***
		(0.0378)	(0.0377)
High Investment Sectors[2/]			0.102***
			(0.0261)
Time fixed effects	Y	N	N
Firm fixed effects	Y	Y	Y
Industry fixed effects	Y	Y	Y
Observations	14,263	14,263	14,263
Number of firms	2,248	2,248	2,248
Robust standard errors in parentheses			
*** p<0.01, ** p<0.05, * p<0.1			

[1/]System GMM specifications, with lagged values of repressors used as instruments.
[2/]High investment sectors are those characterized by higher regression coefficients. These include advanced manufacturing, transportation, communications, health services, education, research and development.

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