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THE COST OF INNOVATION - A CEBR REPORT FOR WASABI

The Economic Cost of Unpredictable Technology Infrastructure

October 2026

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London, October 2026

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Executive summary



COMBINED ANNUAL OVERSPEND

$63.4bn

The eight markets covered by this study incur around $63.4 billion each year in infrastructure overspend attributable to opaque, unpredictable or difficult-to-forecast provider charges.

Our study shows that when infrastructure budgets are exceeded, **firms cut down technology investment, hiring and workforce development, creating a wider economic opportunity cost.**

THE ECONOMIC OPPORTUNITY



ADDITIONAL PRODUCTIVE INVESTMENT

$21.8bn

R&D, AI initiatives and new technology



TRAINING AND WORKFORCE DEVELOPMENT

$7.6bn

Potential reinvestment in skills and upskilling



POTENTIAL ADDITIONAL JOBS

111,450

Full-time equivalent roles supported



LONG-RUN GDP

$20.4bn

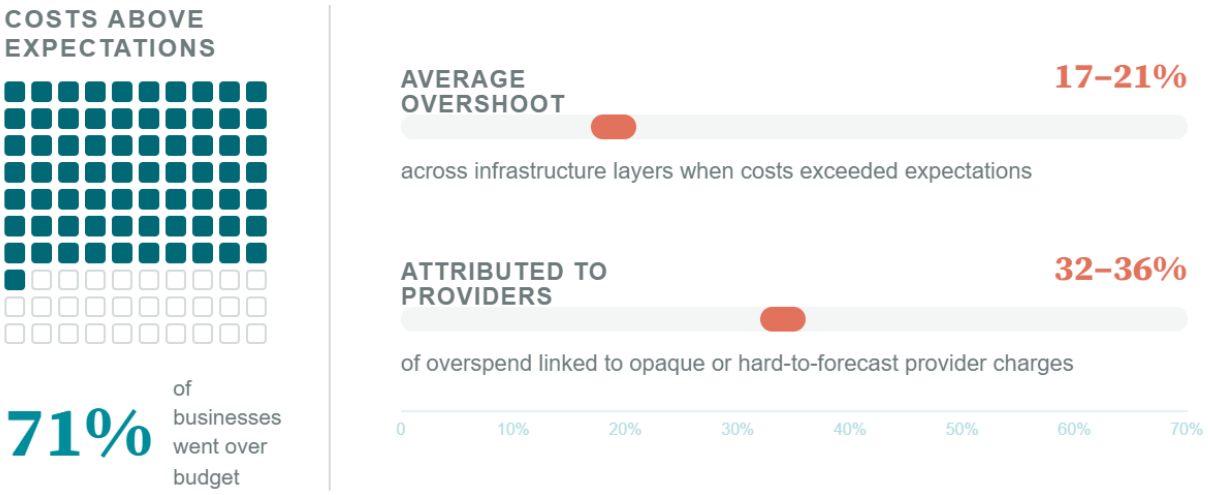
Investment facilitating long-run output

The cost of unpredictability goes beyond the IT budget

- **Avoiding provider-attributable overspend could release substantial resources for productive use.** Cebr estimates that around **$21.8 billion**, roughly one-third of the total overspend identified, could be redirected towards capital-forming investment in R&D, AI initiatives and new technology. A further **$7.6 billion** could support training and workforce development, while expenditure redirected towards recruitment could support approximately **111,450 additional jobs**.
- **The resulting investment could have effects beyond the businesses making it.** Based on the additional capital-forming investment identified above, Cebr estimates a central **long-run GDP uplift of around $20.4 billion** across the eight markets.
- **Businesses themselves point towards the same uses of recovered funds.** Among firms experiencing overspend linked to opaque or difficult-to-forecast provider charges, 37% would redirect recovered expenditure towards AI, automation or data science, while 31% would invest in new technology or software. The same share would improve operational processes or productivity, and 31% would hire additional technology, data, AI or innovation staff.

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A widespread budgeting problem sits behind the economic cost



- **Unexpected infrastructure expenditure is the norm rather than the exception.** Some 71% of surveyed businesses reported infrastructure costs above expectations, including 21% whose costs exceeded budgets significantly. When overspend occurred, actual expenditure was on average 17% to 21% higher than expected depending on the infrastructure layer.
- **Provider pricing accounts for a material share of the gap.** Amongst businesses that overspent in a given infrastructure category, depending on this category, 94-97% of businesses attribute a portion of this overspend to opaque, unpredictable or difficult-to-forecast provider charges. On average, they attribute roughly one-third of higher-than-expected expenditure to these charges.

AI infrastructure drives the largest overspend



- **The infrastructure supporting AI is both strategically important and unusually difficult to budget for.** AI and machine learning infrastructure has the highest average annual expenditure of the six layers examined, at $33.1 million per surveyed business, and is the category most frequently associated with unpredictability and unexpected expenditure. Cebr estimates that it accounts for **$23.4 billion of provider-attributable overspend**, equivalent to around 37% of the eight-market total.

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Infrastructure overspend is displacing other business investment

- **Technology and software investment, training and workforce development, specialist hiring and AI, automation and data science initiatives are all broadly equally impacted by reduced budgets,** when infrastructure costs exceed expectations. Across all of these categories, budget availability is limited a little under 30% of the time, when infrastructure budgets exceed expectations.

- **The effect is strongest among businesses already pushing the innovation frontier.** Technology and software investment is displaced by unexpected infrastructure costs for 33% of more innovative firms, compared with 21% of less innovative businesses. When overspend is avoided, 40% of more innovative firms say they would redirect funds towards AI, automation or data science, while 27% would increase R&D or product development.

Cost pressure is already influencing business decisions

- **Technical choices are being shaped by cost constraints**, with almost one-third of businesses making technical or architectural choices based on cost constraints rather than what they considered optimal. A further 29% have reduced or delayed planned specialist hiring, while 28% have delayed or scaled back an AI, automation or data science initiative.

- **The trade-offs become sharper as budget pressure rises.** Among firms experiencing moderate or significant pressure from unpredictable infrastructure costs, 36% have delayed or scaled back an AI initiative, compared with 20% among businesses facing little or no pressure. They are also around 10 percentage points more likely to reduce or delay specialist hiring and 12 points more likely to make technical or architectural decisions based on cost rather than what they considered optimal.

Cost uncertainty and lock-in risk becoming mutually reinforcing

- **The evidence points to a reinforcing cycle of infrastructure friction**. Businesses that struggle to switch providers are more likely to feel squeezed by unpredictable infrastructure costs: 31% report moderate or significant budget pressure, compared with just 18% of those who find switching easy.

- That pressure appears to become self-reinforcing. Among businesses where opaque or unpredictable provider charges account for at least half their overspend, 40% say they've made technical or architectural decisions based on cost rather than what was actually best for the business, nearly double the 21% seen among firms with no provider-attributable overspend.

  In other words, the harder it is to switch, the more cost pressure seems to build, and the more that pressure pushes businesses toward compromises that make switching even harder.[1]

[1] These findings describe statistical associations within the survey sample. The cross-sectional nature of the data means that causality cannot be inferred: it is equally plausible that switching difficulty drives cost pressure, that pre-existing cost pressure discourages switching, or that both are driven by a common underlying factor such as firm size, sector or the complexity of a business's existing technology estate. Cebr's analysis identifies and quantifies these relationships but does not establish the direction or mechanism of causation between them.

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Foreword

Written by Wasabi co-founder and CEO, David Friend

Today, we are in the midst of perhaps the largest innovation opportunity in generations.

The potential applications for AI in business processes are wider, deeper, and more transformative than anyone could have expected.

That fact is not news. However, in the excitement of change, it would be a mistake to assume that the technology itself is the only factor in how effective and evenly distributed these shifts are. In fact, access to AI models and the skills to apply them are just one part of the equation driving the current industrial revolution.

One big reason for that is the fact that new technology is coming into businesses on top of a deep stack of infrastructure, both relying on a wide array of other services and changing how those services are operationally used. It has been widely noted that the quality of data going into an AI solution decides, to a large extent, the quality of its outputs. We can say something similar about the infrastructure underpinning AI in terms of how effectively and efficiently its impacts are felt by businesses and economies.

This reality isn't exclusive to AI implementation, of course. Innovation programmes of all kinds build on what came before, and that broader system has decisive effects on whether business innovation flies or crashes.

At Wasabi, we believe the infrastructure behind innovation should enable progress, not constrain it. Businesses should be able to put all of their data to work, adopt new technologies, and invest in what comes next without unnecessary cost and complexity standing in the way.

Following that principle, we decided to commission this research into the infrastructure costs associated with innovation that the current conversation usually misses. We wanted to understand how innovation impacts spending, how those unexpected costs affect a business, and how much innovation and growth we are missing out on as a result.

Our research partner in this exercise, the Centre for Economics and Business Research (Cebr), are leaders in the kind of subtle, complex economic analysis needed to answer those questions, with a long track record of accurately and persuasively forecasting economic consequences. Our work together has revealed a striking story that hasn't been told before, discovering a monumental cost centre for businesses across major economies which is directly limiting productive investment and workforce growth.

The innovation opportunity today is huge, but significantly narrower than it could be, and there are economic effects tightening the squeeze on the businesses that could benefit the most.

This report explains why that is, and the scope of the benefits we stand to unlock by addressing the cost of innovation. We think it is important reading for anyone who cares about the health of the innovation ecosystem.

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1. Introduction and context

1.1 Background and purpose of the report

Enterprise technology investment is rising rapidly as businesses move from AI experimentation towards deployment at scale. Gartner forecasts global IT spending to grow by 14.2% in 2026, while server expenditure is expected to rise by 36.9%, reflecting particularly strong demand for the compute capacity required to support AI and other data-intensive technologies.[2]

This raises an important question for businesses: to what extent is this growth in infrastructure expenditure planned and budgeted for, and how much is being incurred unexpectedly? As technology infrastructure becomes a larger component of business expenditure, unexpected or difficult-to-forecast costs have greater potential to displace resources from investment, innovation and hiring.

Against this backdrop, this report, prepared by Cebr on behalf of Wasabi, examines the scale and drivers of unpredictable infrastructure expenditure across eight markets, the extent to which businesses attribute overspend to opaque or difficult-to-forecast provider charges, and the potential economic opportunity if some of this expenditure could instead be directed towards productive uses.

1.2 Scope of the research

The study covers businesses in the UK, US, Germany, France, Italy, Japan, Australia and New Zealand. It considers six areas of technology infrastructure: storage, compute, networking, data and databases, AI and machine learning infrastructure, and hardware and supply-chain infrastructure.

The analysis examines differences across countries, business size and, where sample sizes permit, sectors. Particular attention is given to differences between SMEs and large businesses, reflecting the potential for infrastructure cost pressures to affect firms differently depending on their scale and capacity to absorb unexpected expenditure.

Survey and respondent profile

The findings are based on a survey of 690 technology and infrastructure decision-makers conducted by Sapio Research in July and August 2026. Respondents were drawn from the eight markets covered by the study and were selected on the basis of their direct involvement in technology infrastructure decisions.

The sample is weighted towards senior decision-makers, with 61% of respondents holding C-suite or director-level positions. Large businesses account for 76% of the sample, while 24% represent SMEs. Respondents are drawn from a broad range of sectors, including ICT, financial services, manufacturing and professional, scientific and technical services.

Businesses represented in the survey are relatively large in economic terms, with average annual revenue of approximately $522 million and a median of around $174 million. This profile is taken into account in the economic modelling and in the interpretation of the survey results.

[2] Gartner (2026), *Gartner Forecasts Worldwide IT Spending to Grow 10.8% in 2026, Totaling $6.15 Trillion*, worldwide IT spending forecast, accessed 10 September 2026.

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Economic modelling

Alongside the survey analysis, Cebr developed an economic modelling framework to quantify the wider implications of infrastructure overspend.

In the first stage, we estimate the value of infrastructure overspend attributable to opaque, unpredictable or difficult-to-forecast provider charges. We then estimate how this expenditure could otherwise be allocated across productive investment, workforce training and hiring. The aim is to size the potential wider economic effect associated with the additional capital-forming investment identified.

The modelling is intended to provide an indication of the scale of the economic opportunity associated with reducing avoidable infrastructure overspend. Detailed assumptions, data sources and sensitivity testing are set out in the methodology section.

1.3 Structure of the report

The remainder of the report is structured around the progression from infrastructure expenditure to its wider economic consequences.

- **Section 2** covers infrastructure spending patterns across the six technology layers, alongside the current innovation landscape.
- **Section 3** assesses the prevalence and scale of unpredictable infrastructure costs.
- **Section 4** examines the provider-related drivers of overspend and quantifies the avoidable overspend across the markets in scope.
- **Section 5** considers how recovered expenditure could support investment, skills and employment, together with the potential wider economic effect.
- **Section 6** examines the broader implications of infrastructure constraints for innovation and firms' ability to switch providers or adopt alternative technologies.
- **Section 7** sets out Wasabi's perspective on what comes next.
- **Section 8** sets out our methodology.

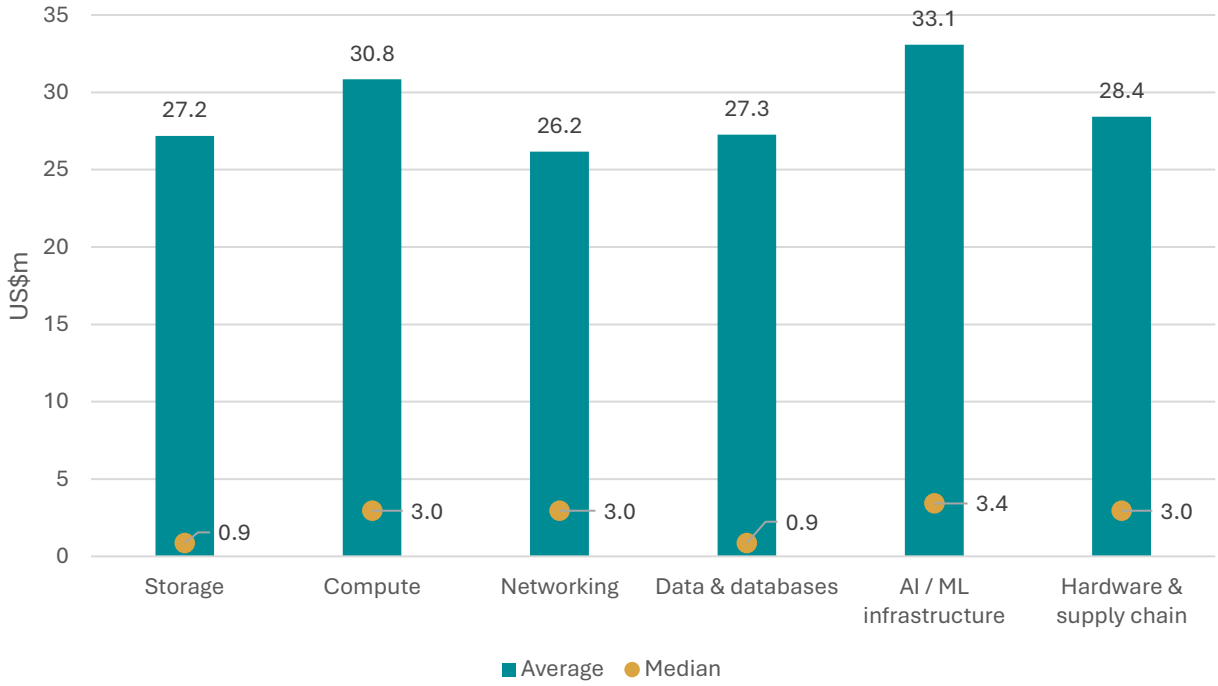
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2. Infrastructure spend

2.1 The infrastructure footprint

Technology infrastructure represents a significant area of expenditure for businesses in the survey. Across the six infrastructure layers considered, average annual spending across the sample ranges from approximately **$26 million to $33 million per firm**.

Figure 1: Average and median spend by infrastructure layer



Source: Cebr analysis of Sapio survey

As shown in **Figure 1**, **expenditure is highest for AI and machine learning infrastructure**, at $33.1 million on average, followed by compute, at $30.8 million. Average expenditure is slightly lower for hardware and supply-chain infrastructure ($28.4 million), data and databases ($27.3 million), storage ($27.2 million) and networking ($26.2 million).

These averages, however, mask considerable variation in expenditure across firms. We also report the **median**, which represents the midpoint of the expenditure distribution and is less affected than the mean by a small number of very high-spending businesses. Median spending is substantially lower, ranging from $0.9 million for storage and data and databases to $3.4 million for AI/ML infrastructure. This gap reflects a strongly right-skewed distribution, with a relatively small number of very large infrastructure users accounting for a disproportionate share of total reported expenditure.

This is particularly evident among firms in the highest expenditure band of $250 million or more. Depending on the infrastructure layer, these firms represent only **1% to 3% of respondents**, but account for between **19% and 36% of total reported spending**. The concentration is greatest for AI/ML infrastructure, where 3% of respondents account for 36% of expenditure.

The results therefore point to two distinct features of the infrastructure spending landscape. First, AI/ML and compute represent the largest areas of expenditure on average. Second, infrastructure spending is highly concentrated among a relatively small group of large spenders. For this reason, subsequent analysis distinguishes between mean expenditure, which is informative about the overall

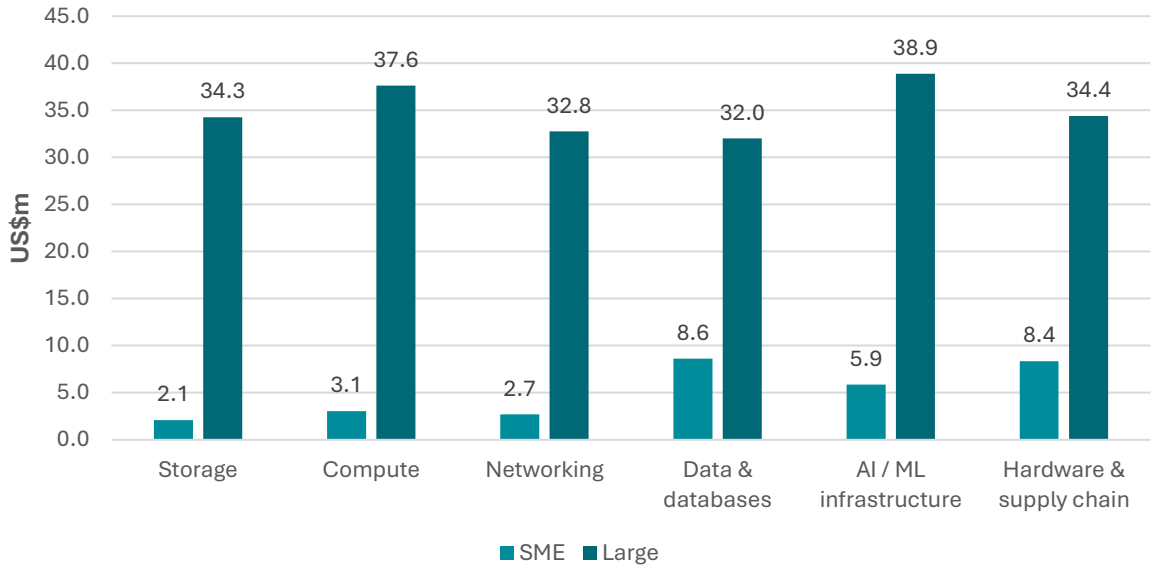
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scale of spending, and median expenditure, which provides a more representative indication of the position of a typical business.

2.2 How infrastructure spending varies across businesses

Company size is the clearest and most consistent determinant of infrastructure expenditure. As shown in **Figure 2** below, large businesses report substantially higher average annual spend than SMEs throughout, with the widest gaps in storage, where average spend is around 16 times higher ($34.3 million compared with $2.1 million), and compute, where it is around 12 times higher ($37.6 million compared with $3.1 million). The gap is narrower for data and databases and for hardware and supply-chain infrastructure, although large-business expenditure remains around four times higher in both cases.

Figure 2: Average annual infrastructure spend by company size



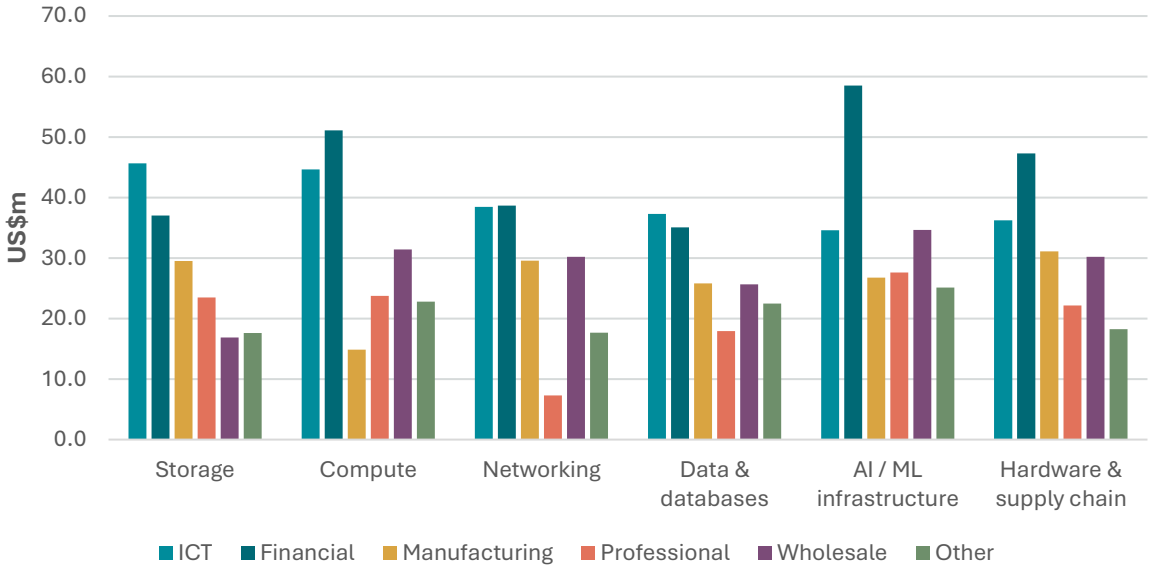
Source: Cebr analysis of Sapio survey

The difference between SMEs and large businesses is even clearer when looking at median expenditure. Average SME spending is affected by a small number of very high-spending respondents, particularly in data and databases, AI/ML infrastructure and hardware. Given the smaller SME sample, these observations have a comparatively large effect on the mean. Median expenditure, which is less sensitive to these outliers, remains below $0.2 million across most infrastructure categories for SMEs, compared with approximately $3.4 million to $4.0 million among large businesses.

Sector also has a material bearing on infrastructure expenditure. Figure 3 shows financial services records the highest average spend in four of the six infrastructure categories, including compute ($51.1 million), AI/ML infrastructure ($58.5 million) and hardware and supply chain ($47.3 million). ICT firms also report consistently high expenditure, particularly on storage ($45.6 million) and compute ($44.6 million). Manufacturing sits below these two sectors across most categories but remains relatively infrastructure-intensive, while professional services and the broader “other” group generally report lower average spend.

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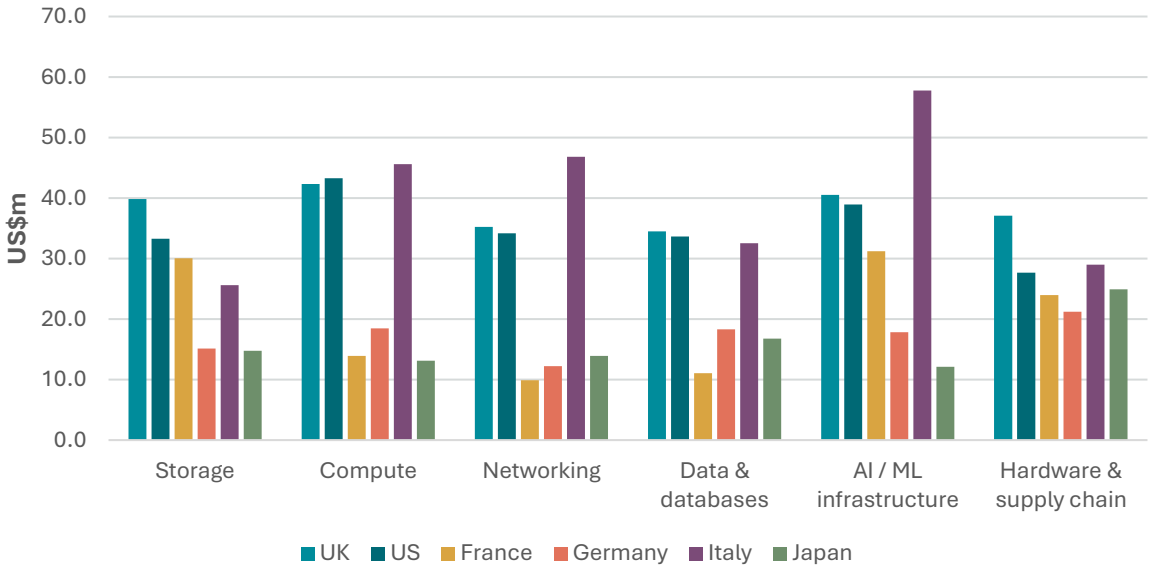
Figure 3: Average annual infrastructure spend by sector



Source: Cebr analysis of Sapio survey

Median expenditure suggests that high spending is more broadly distributed across financial services than ICT. Financial services records the highest median expenditure across all six infrastructure categories, generally around $12 million to $14 million, compared with approximately $2 million to $4 million for ICT firms. ICT's relatively high average expenditure in some categories therefore appears to reflect a smaller number of particularly high-spending firms, whereas elevated expenditure is more typical across financial services respondents. Professional services remains towards the lower end of the distribution across several categories.

Figure 4: Average annual infrastructure spend by market[3]



Source: Cebr analysis of Sapio survey

[3] Australia and New Zealand are excluded from the market comparison due to smaller sample sizes, which make disaggregated expenditure estimates less robust.

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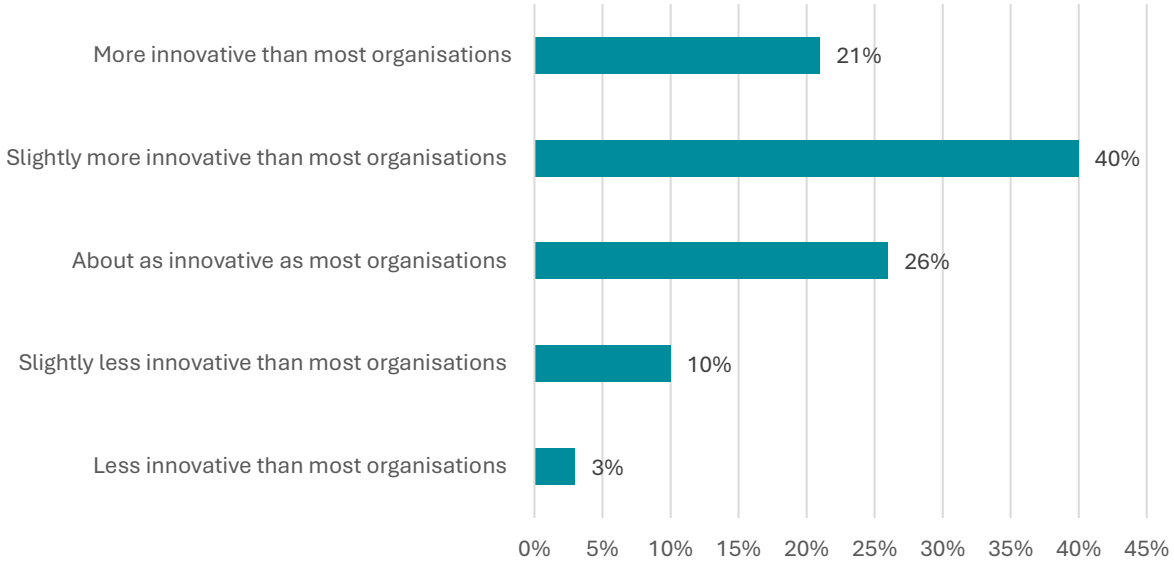
Apparent differences between markets partly reflect differences in the businesses surveyed within each country. As shown in Figure 4, average infrastructure expenditure is generally highest in the UK, US and Italy, with Italy standing out for compute ($45.6 million), networking ($46.8 million) and AI/ML infrastructure ($57.8 million). Reported averages are lower in Germany and Japan across much of the infrastructure stack. However, the size and sector composition of the national samples differs, meaning that these figures should not be interpreted as like-for-like measures of underlying market expenditure.

Controlling for company size substantially narrows some of these cross-country differences. Among large enterprises only, median expenditure on storage and networking falls within a relatively narrow $3.0 million to $4.0 million range across the UK, US, France, Germany and Italy. Therefore, some of the variation observed in the headline country averages reflects differences in SME and large-enterprise representation, alongside the influence of a small number of very high-spending respondents, rather than country effects alone.

2.3 The innovation baseline

Most businesses see themselves as relatively innovative, although this confidence is concentrated among larger firms. Across the survey, as shown in **Figure 5**, 62% of businesses describe themselves as more innovative than most organisations in their industry. A further 26% place themselves broadly in line with their peers, while 12% consider themselves less innovative. useful baseline for interpreting subsequent findings on innovation expenditure and constraints.

Figure 5: Businesses' perceived innovation position relative to industry peers



Source: Cebr analysis of Sapio survey.

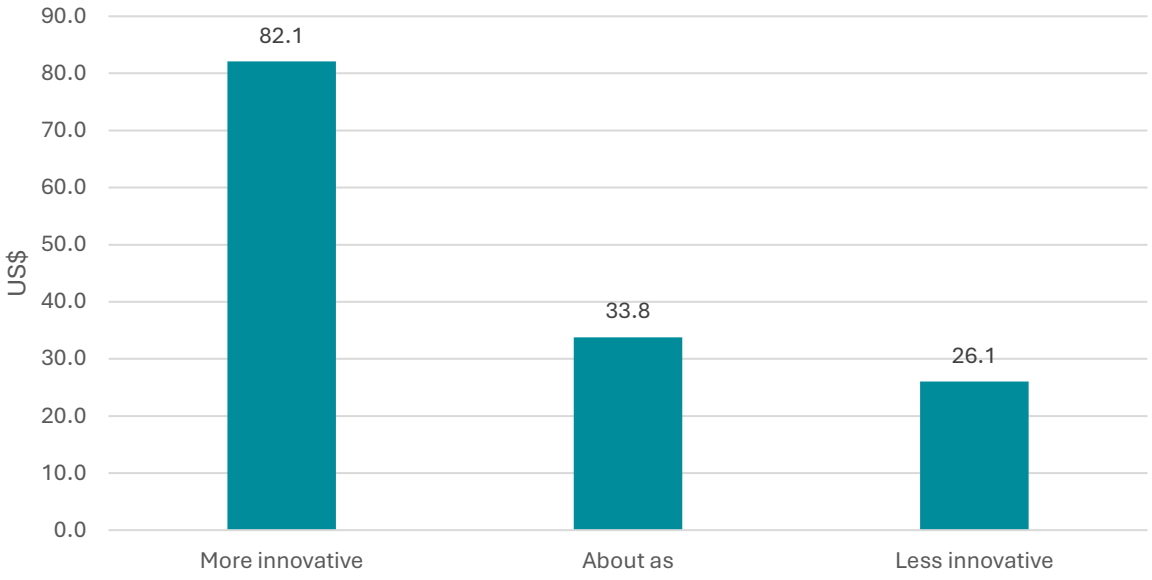
Larger firms substantially more likely to perceive themselves as innovation leaders. 68% of large enterprises consider themselves more innovative than most organisations in their industry, compared with 42% of SMEs. Conversely, 23% of SMEs consider themselves less innovative than their peers, more than twice the 9% recorded among large enterprises.

This difference in perceived innovation is reflected in businesses' existing levels of innovation expenditure. As **Figure 6** shows, reported spending on innovation activities rises sharply with businesses' perceived innovation position. Organisations describing themselves as more innovative than their industry peers report average annual expenditure of around **$82.1 million** on

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R&D, product development, AI initiatives and new technology adoption, including relevant staff costs. This compares with **$33.8 million** among businesses that see themselves as broadly as innovative as their peers and **$26.1 million** among the less innovative group.

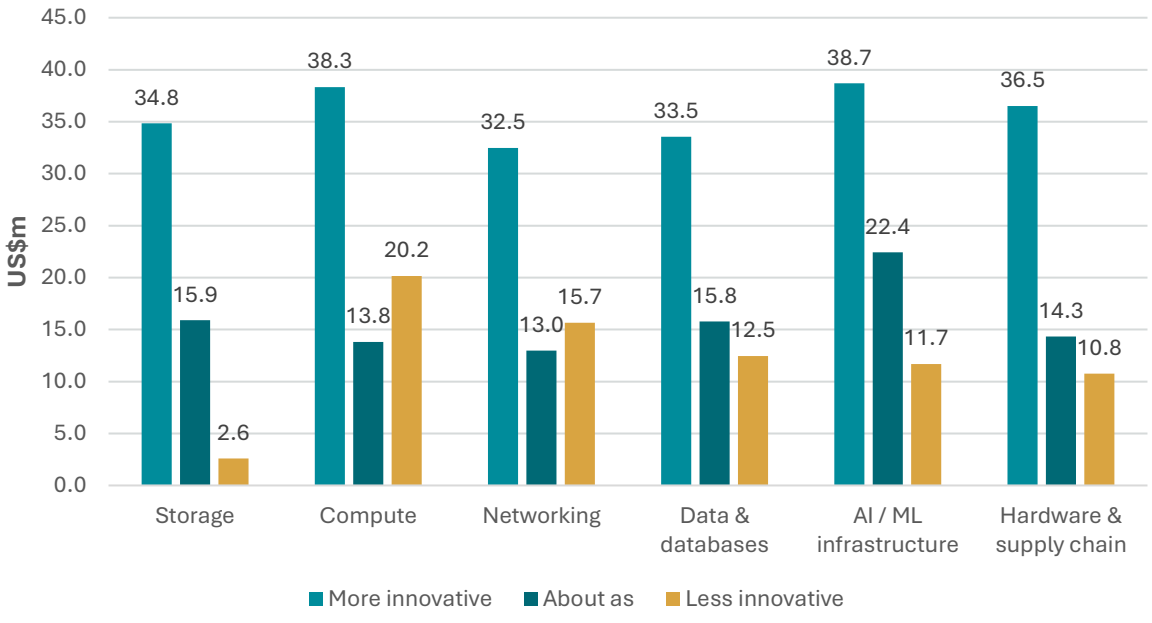
Figure 6: Average annual innovation, R&D and technology expenditure, by perceived innovation level



Source: Cebr analysis of Sapio survey.

The pattern is consistent with the wider infrastructure results, with businesses identifying as more innovative also reporting substantially higher expenditure across most infrastructure layers. These figures should be interpreted as an association rather than a causal relationship, since more innovative businesses are also more likely to be larger and to have greater overall spending capacity.

Figure 7: Average annual infrastructure expenditure by perceived innovation level and infrastructure layer



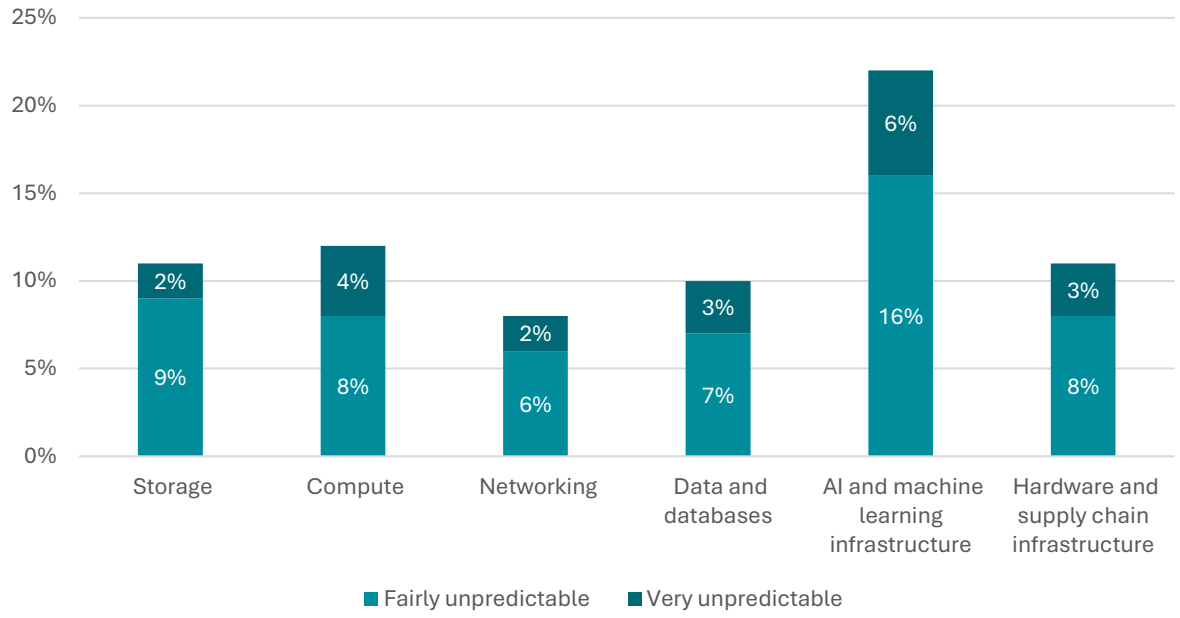
Source: Cebr analysis of Sapio survey.

3. The scale of unpredictable infrastructure costs

3.1 Budget pressure from unpredictable costs

Cost unpredictability is present across all infrastructure layers, but it is significantly more pronounced for AI and machine learning infrastructure. As shown in **Figure 8**, around 22% of businesses describe AI and machine learning infrastructure costs as fairly or very unpredictable, almost twice the share recorded for any other layer. Elsewhere, the proportion reporting unpredictable costs ranges from 8% to 12%.

Figure 8: Share of businesses reporting unpredictable infrastructure costs, by infrastructure layer



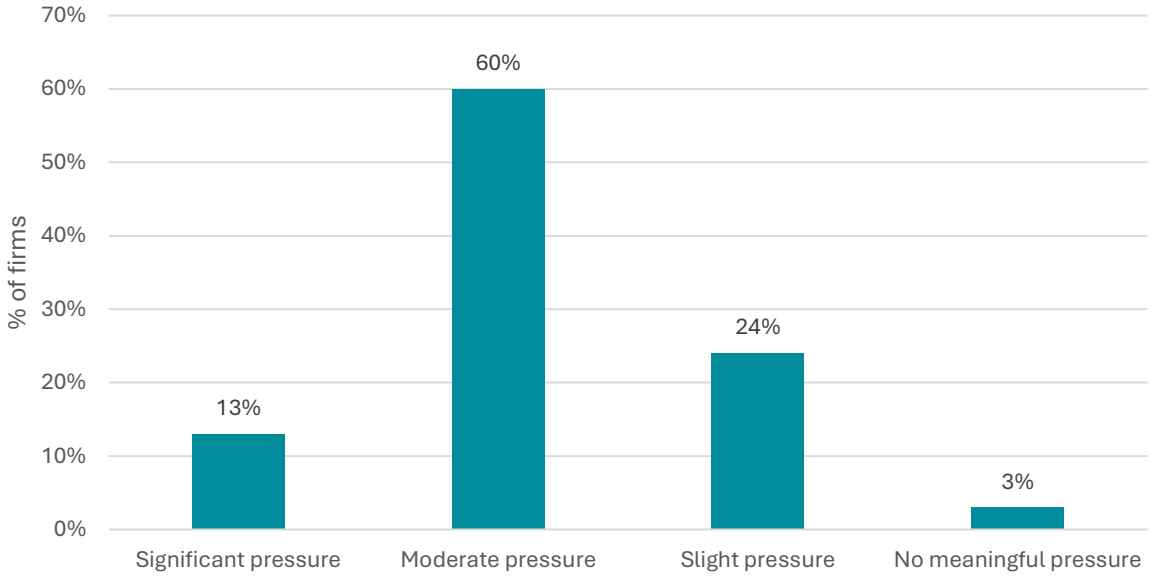
Source: Cebr analysis of Sapio survey.

The pattern also varies across markets and business characteristics. In Japan, 41% of businesses report AI and machine learning infrastructure costs as unpredictable. Less innovative businesses also report higher levels of unpredictability across all six layers, including 30% for AI and machine learning infrastructure and 26% for compute. The financial services sector also reported slightly higher unpredictability than ICT and other sectors across several infrastructure layers.

For businesses experiencing unpredictable costs for at least one infrastructure category (200 respondents, or 29% of the total sample), the consequences are material. Among these respondents, 73% said these created significant or moderate budget pressure, including 13% reporting pressure severe enough to require material cuts or delays elsewhere and 60% requiring some budget adjustment. A further 24% described the pressure as slight but manageable within existing budgets.

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Figure 9: Budget pressure among businesses experiencing unpredictable or unplanned infrastructure costs



Source: Cebr analysis of Sapio survey.

The budgetary impact also appears somewhat more acute among SMEs. Among respondents experiencing unpredictable infrastructure costs, 79% of SMEs reported significant or moderate budget pressure, compared with 71% of large enterprises. The difference is more pronounced at the severe end of the scale, with 21% of SMEs reporting significant pressure requiring material cuts or delays elsewhere, almost twice the 11% share among large enterprises. Large enterprises were instead more likely to describe the pressure as slight but manageable.

3.2 Prevalence of infrastructure overspend

Infrastructure costs exceeded expectations for a clear majority of businesses over the past year. Across the full sample, 71% of respondents said their actual technology infrastructure costs were higher than budgeted or expected, including 21% who reported that costs exceeded expectations significantly and 50% who said they exceeded them somewhat.

The incidence of overspend is broad-based, but the cross-breaks point to some notable differences. As a key example, large enterprises are more likely than SMEs to report costs above expectations, at 74% compared with 63%, while the rate rises to 77% among businesses that consider themselves more innovative. Overspend is also especially common in ICT and financial services, at 81% and 76% respectively. Across markets, the highest incidence is reported in France, at 79%, followed by Australia and New Zealand at 78%. Italy reports a lower rate of budget overrun on infrastructure costs (52%) and seems to be a general country-level pattern as it holds consistently across sectors and company-size bands.

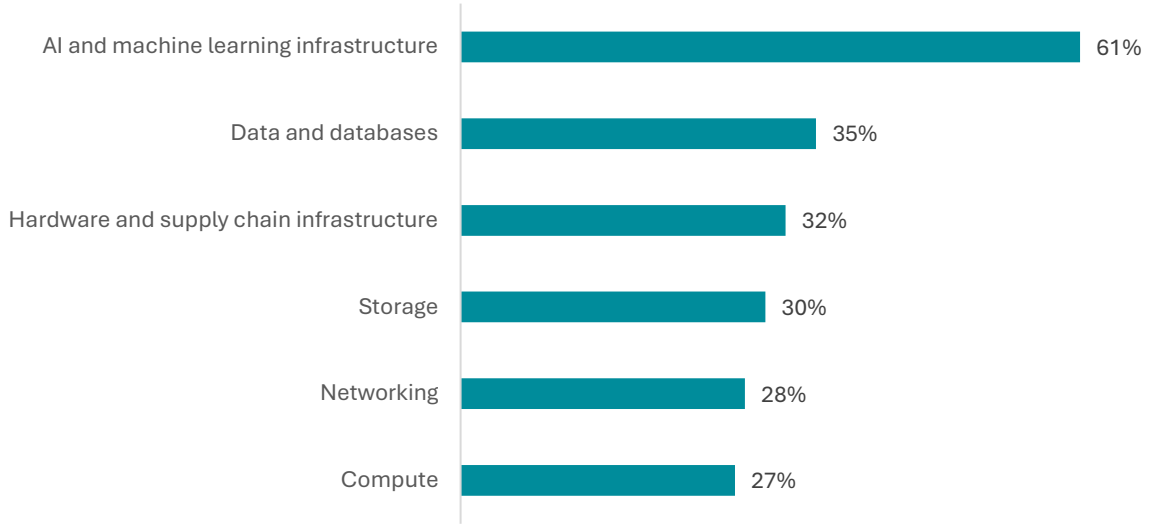
3.3 Overspend by infrastructure layer

Among businesses whose infrastructure costs exceeded expectations**, AI and machine learning infrastructure was by far the most common source of higher-than-expected or unplanned expenditure, cited by 61% of firms.** The concentration is even stronger among some groups: 75% of respondents in France, 70% in financial services, 69% in ICT and 69% of more innovative businesses reported higher-than-expected AI and machine learning infrastructure costs. Large

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enterprises were also more likely than SMEs to cite this area, at 66% compared with 44%. AI and machine learning infrastructure is therefore not only perceived as the least predictable layer, but is also the area in which unexpected costs are most commonly realised among businesses that overspend.

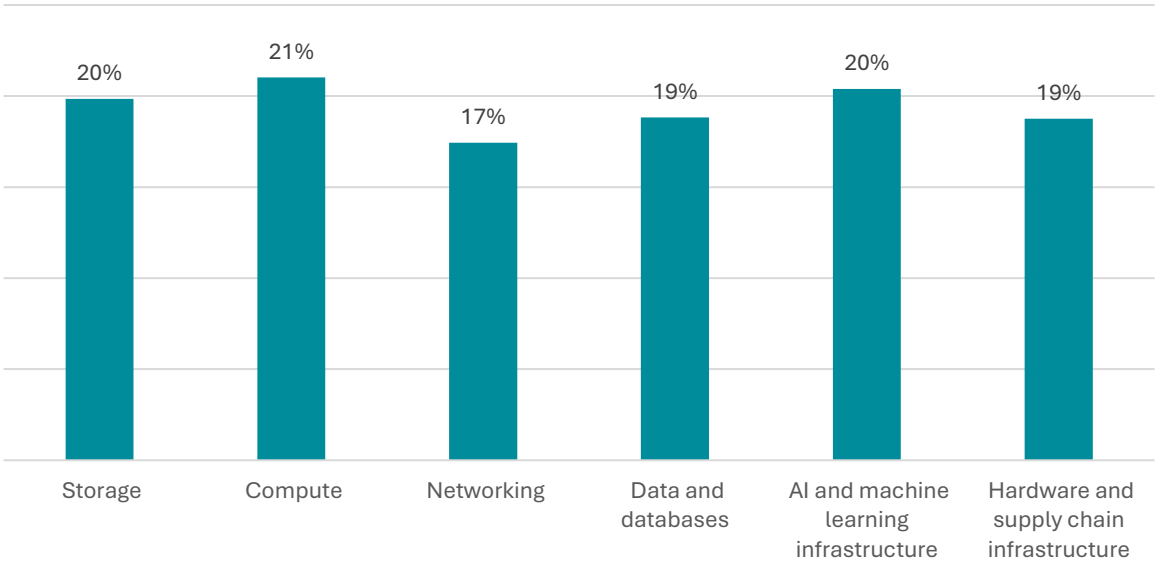
Figure 10: Share of businesses experiencing higher-than-expected or unplanned costs by infrastructure layer



Source: Cebr analysis of Sapio survey

Higher-than-expected costs are sizeable when they occur, with actual spending on average around **17% to 21% above expectations**. As shown in Figure 11, the largest average overshoots were reported for compute, at 21%, followed by storage and AI and machine learning infrastructure, both at 20%. The distribution also varies across layers: AI and machine learning overspend is concentrated in the 10% to 29% range, while compute has the highest incidence of very large overshoots, with 10% of affected businesses reporting spending at least 50% above expectations.

Figure 11: Average infrastructure overspend by infrastructure layer



Source: Cebr analysis of Sapio survey

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The findings in this section show that while infrastructure cost uncertainty is generally both widespread and material, the issue is most acute in AI and machine learning infrastructure, where unpredictability and overspend are reported most frequently. Sizeable overshoots are also evident across the wider infrastructure stack. This provides the basis for the next section, which examines the extent to which these unexpected costs are linked to provider pricing practices and other specific cost drivers.

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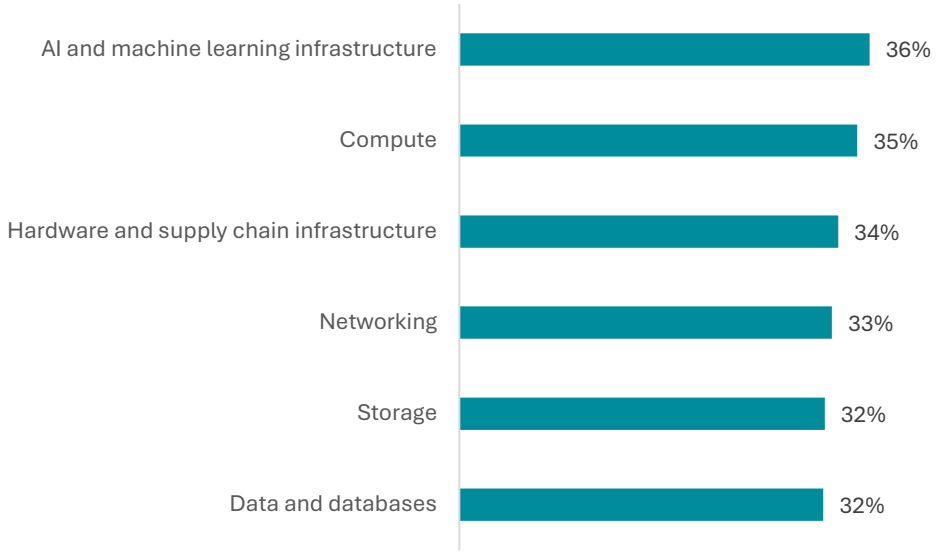
4. Provider-related drivers of overspend

Higher-than-expected infrastructure spending can reflect a range of factors, including stronger-than-anticipated usage, changes in internal requirements or planning assumptions, as well as provider pricing structures and charges that are difficult to anticipate. The focus of this study is specifically on the provider-related component of overspend, so respondents were asked to estimate how much of their higher-than-expected spending was driven by opaque, unpredictable or difficult-to-forecast provider charges rather than by their own usage growth or internal planning decisions.

4.1 Provider-attributable overspend

Businesses attribute roughly one-third of higher-than-expected infrastructure spending to opaque, unpredictable or difficult-to-forecast provider charges. Across the six infrastructure layers, the average share attributed to provider charges ranges from **32% to 36%**, with the highest estimate for AI and machine learning infrastructure, at 36%. The relatively narrow range shows that provider-related charges are a material and consistent component of overspend across the infrastructure stack rather than being confined to one specific area.

Figure 12: Average share of higher-than-expected infrastructure spending attributed to provider charges, by infrastructure layer



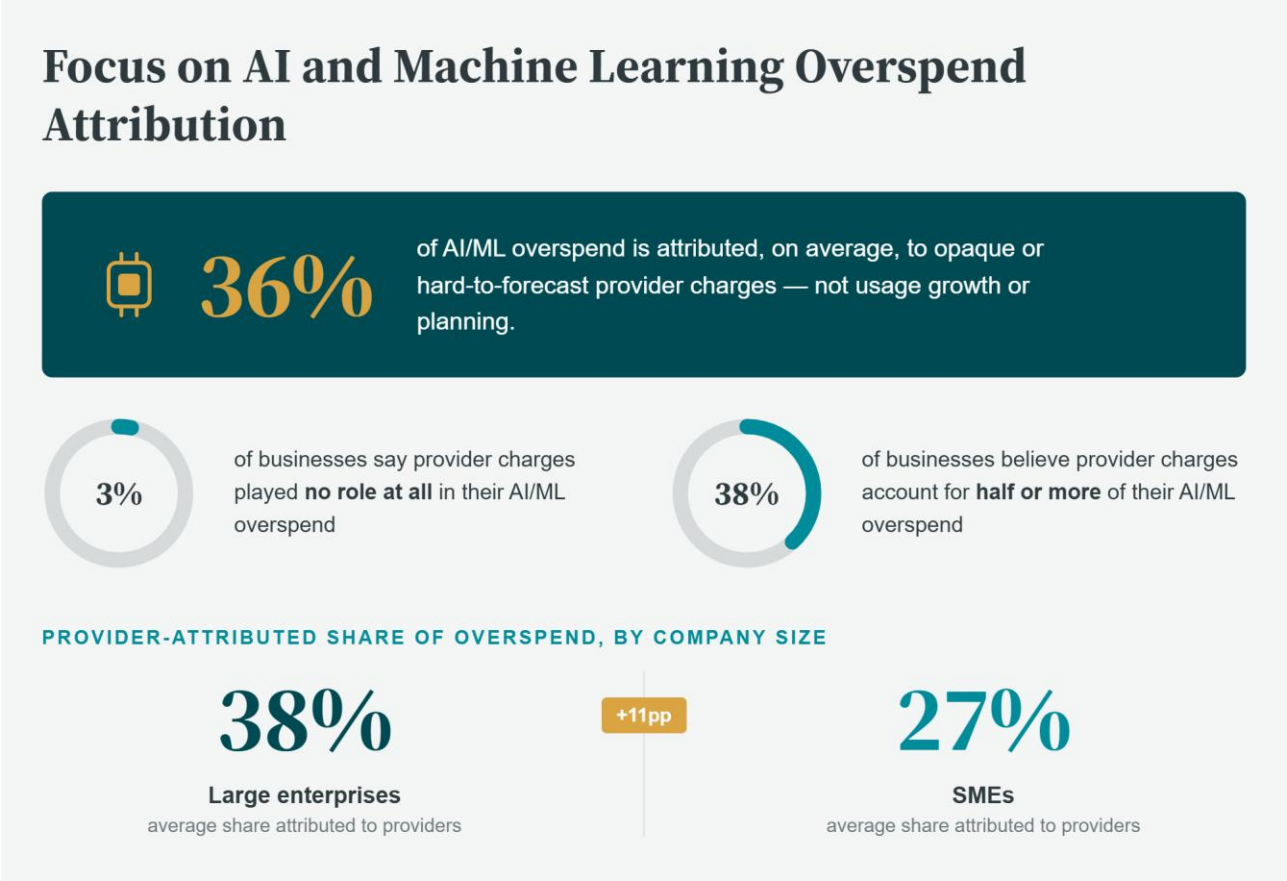
Source: Cebr analysis of Sapio survey.

The distribution also shows that, for a meaningful minority of affected businesses, provider charges account for a much larger share of overspend. In AI and machine learning infrastructure, 38% of respondents attribute at least half of their higher-than-expected spending to provider charges, compared with 37% for compute and 33% for hardware and supply-chain infrastructure. At the other end of the scale, only 3% to 6% of respondents across the six layers say that none of their overspend was attributable to provider charges.

Within AI and machine learning infrastructure, **attribution is notably higher among large enterprises than SMEs**, at 38% compared with 27%. There is also some variation across markets, with respondents in the US and UK attributing around 40% and 39% respectively of AI and machine learning overspend to provider charges, compared with 33% in France. Notable variation is also

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seen across industries, with the financial services sector reporting 42%, compared with 37% among ICT firms.



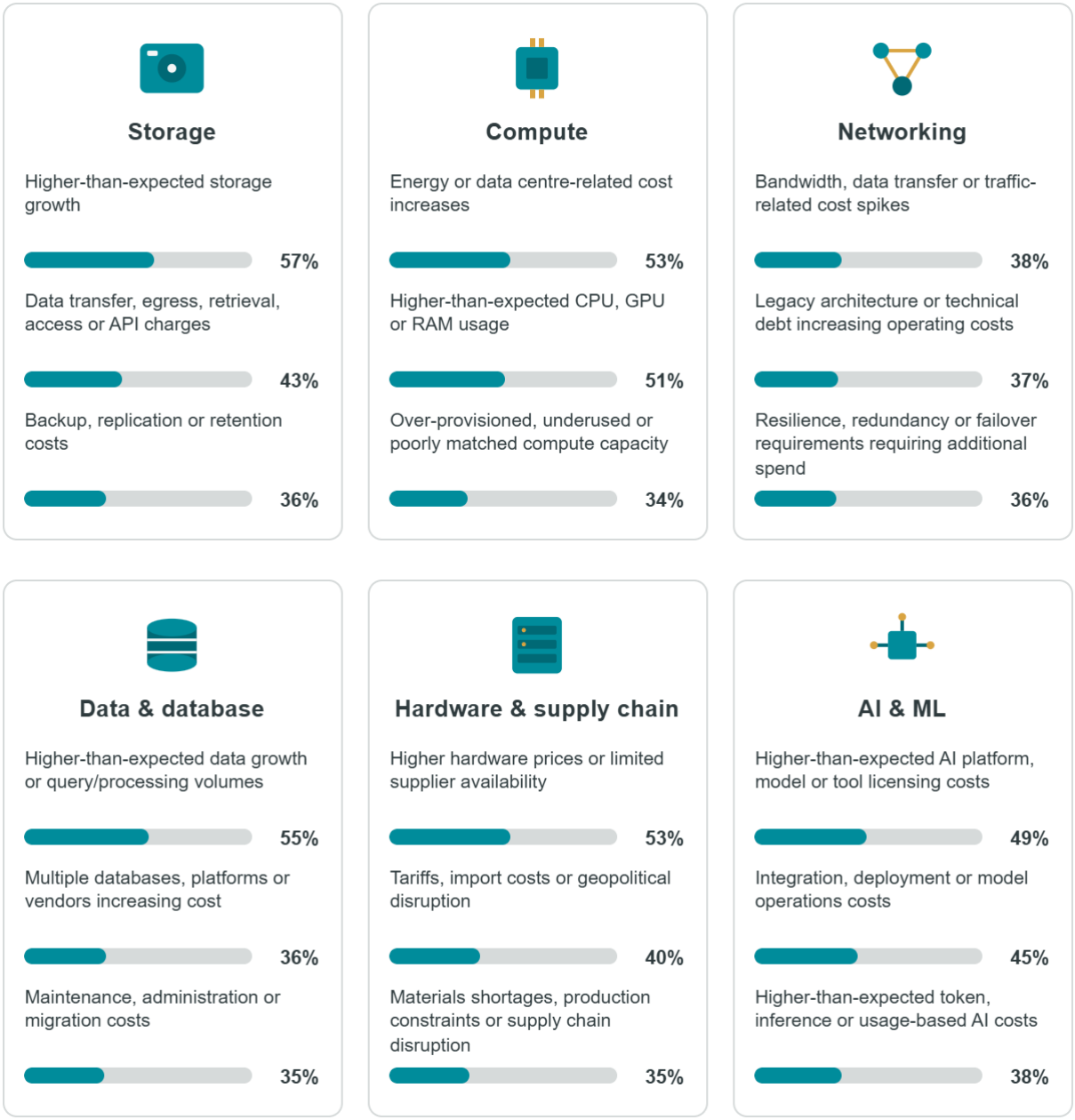
Source: Cebr analysis of Sapio survey.

4.2 Drivers of unexpected costs

The drivers of higher-than-expected costs point to a combination of business-side pressures and provider-related pricing or market factors. Faster-than-expected usage is prominent in storage, data and databases, compute and AI, but businesses also cite charges and constraints that sit more directly within provider pricing structures. For example, **43% of businesses experiencing storage overspend identify data transfer, egress, retrieval, access or API charges as a leading cause**, while higher-than-expected AI platform, model or tool licensing costs are cited by 49% of those experiencing AI and machine learning overspend. These findings sit within a highly concentrated cloud market in which regulators have identified significant market power among the largest providers and specifically highlighted egress fees, interoperability barriers and licensing practices as constraints on customer choice.[4]

[4] CMA (2025), *Cloud Services Market Investigation: Final Decision*, 31 July 2025, accessed 22 September 2026.

Figure 13: Top three reported drivers of higher-than-expected costs, by infrastructure layer



Source: Cebr analysis of Sapio survey

4.3 The national cost of avoidable infrastructure overspend

To estimate the national value of avoidable infrastructure overspend, Cebr combined three survey inputs for each infrastructure layer: typical annual expenditure, the reported rate of overspend and the share of that overspend attributed to opaque, unpredictable or difficult-to-forecast provider charges. These per-firm estimates were calculated separately by market and business size, adjusted to reflect the proportion of firms actually experiencing overspend in each layer, and then scaled to national business populations using official statistics.

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$63.4bn

Estimated annual provider-attributable infrastructure overspend across the eight markets

64%

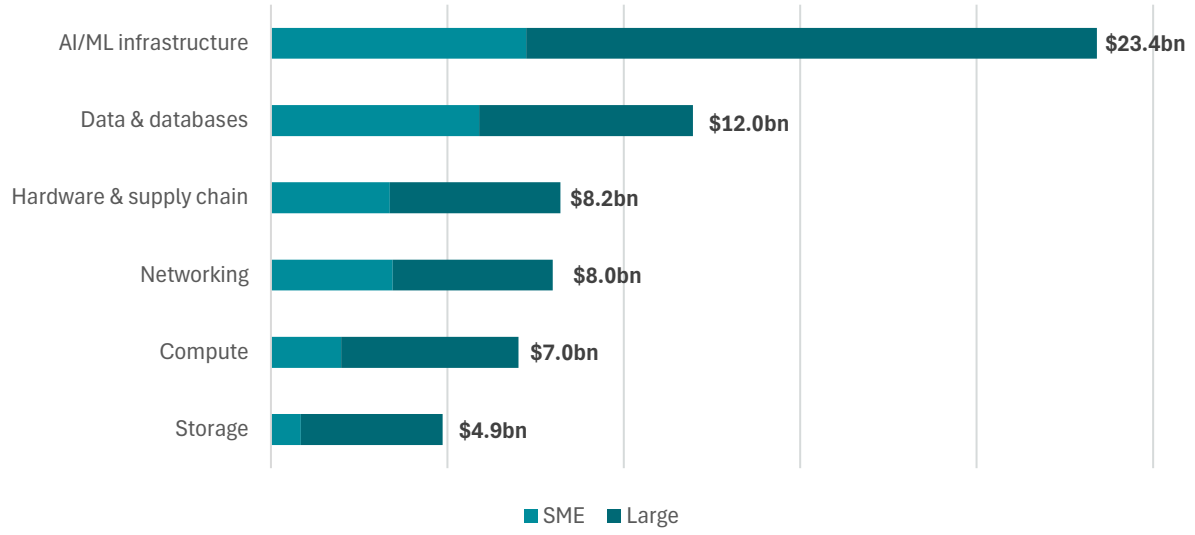
borne by large enterprises

37%

attributable to AI and machine learning infrastructure

Cebr estimates that businesses across the eight markets incur around **$63.4 billion** annually in infrastructure overspend attributable to opaque, unpredictable or difficult-to-forecast provider charges. To put the scale of this estimate into context, across these eight markets alone, this is equivalent to around **13% of the approximately $500 billion currently being invested globally in AI each year**, as cited by the Bank for International Settlements.[5]

Figure 14: Annual provider-attributable infrastructure overspend, by infrastructure layer and size across the eight markets



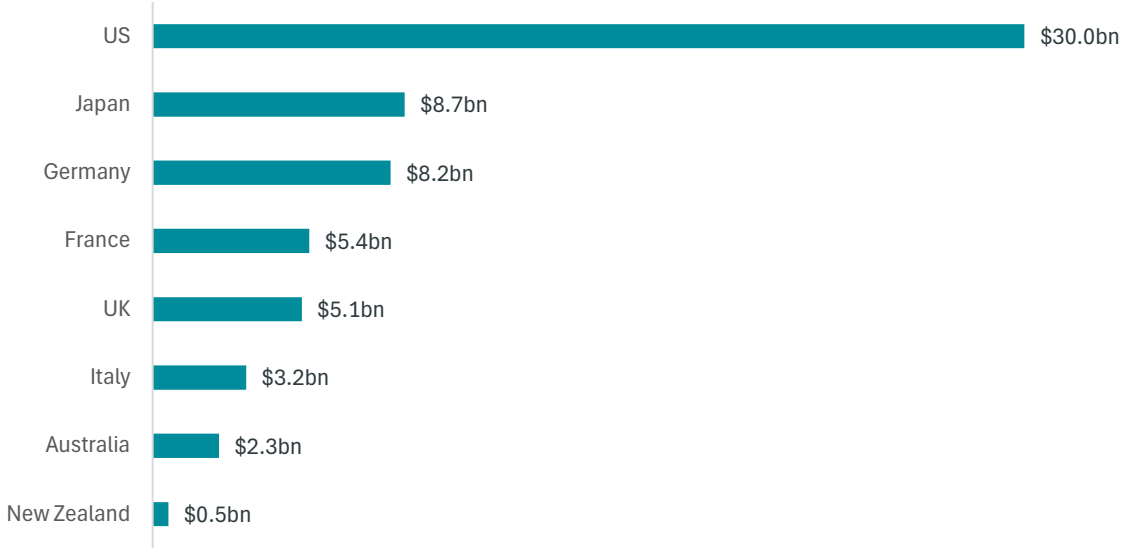
Source: Cebr analysis of Sapio survey

AI and machine learning infrastructure accounts for the largest share of the estimated cost. At around $23.4 billion, it represents approximately 37% of provider-attributable overspend across the eight markets, followed by data and databases at $12.0 billion. Large enterprises account for around $40.6 billion, or 64% of the overall estimate, compared with $22.8 billion among SMEs. The prominence of AI and machine learning infrastructure is consistent with the survey evidence presented earlier, where it also recorded the highest incidence of cost unpredictability, unexpected expenditure and provider-attributed overspend.

[5] BIS

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Figure 15: Estimated annual provider-attributable infrastructure overspend, by market



Source: Cebr analysis of Sapio survey

The US accounts for the largest share of the estimated total, at around $30.0 billion, followed by Japan at $8.7 billion and Germany at $8.2 billion. France shows an especially high concentration in AI and machine learning infrastructure, which accounts for around 64% of its estimated avoidable overspend. These estimates reflect differences in business populations and underlying infrastructure expenditure as well as the survey evidence on overspend. Country comparisons should therefore be interpreted primarily as estimates of the aggregate national scale of the issue rather than as direct rankings of provider pricing behaviour.

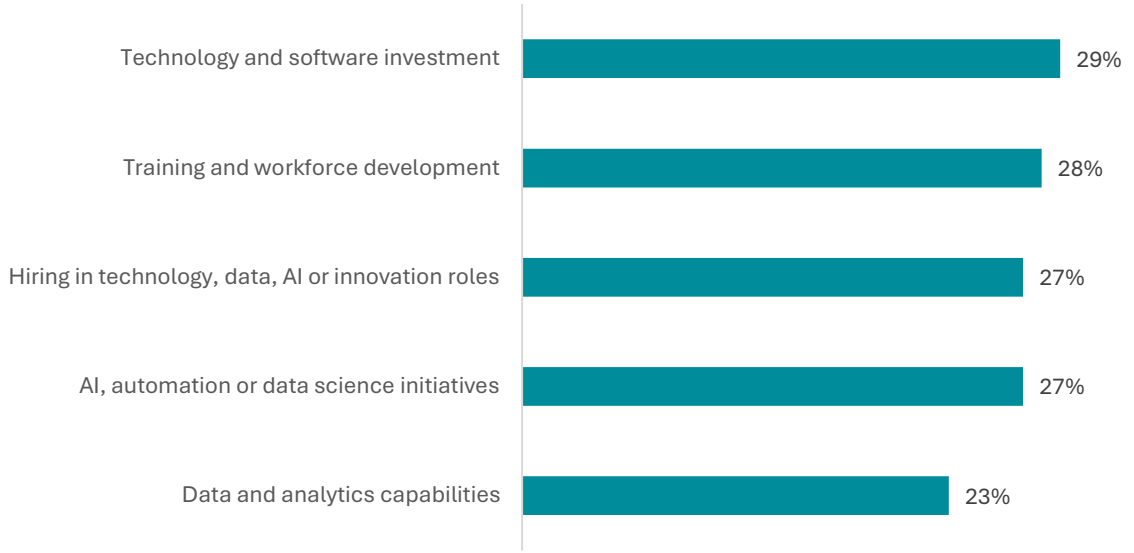
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5. The opportunity cost of infrastructure overspend

5.1 Budgets displaced by higher infrastructure costs

Higher-than-expected infrastructure costs most commonly displace technology investment, workforce development and specialist hiring. Across affected businesses, 29% said technology and software investment was among the areas most likely to miss out on budget, followed by training and workforce development at 28%, and both specialist hiring and AI, automation or data science initiatives at 27%.

Figure 16: Share of firms reporting areas most likely to lose budget when infrastructure costs exceed expectations



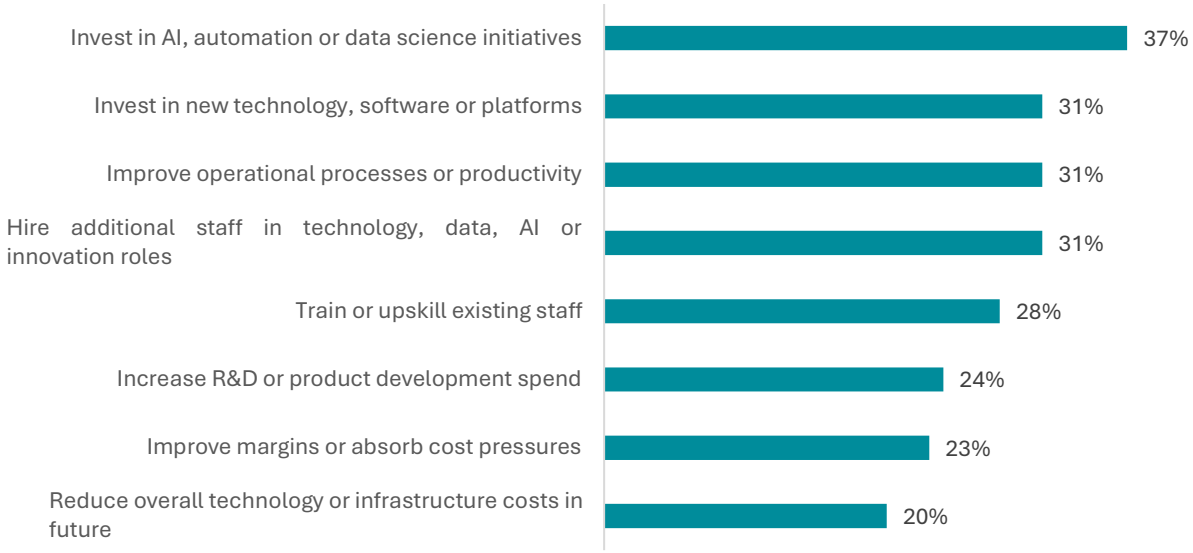
Source: Cebr analysis of Sapio survey

The effects also vary with businesses' innovation position: technology and software investment is cited by 33% of more innovative businesses, compared with 21% of less innovative firms, while AI and data science initiatives show a similar pattern. The pattern varies somewhat across markets: technology investment and specialist hiring are particularly prominent in the UK, at 37% and 38% respectively, while AI, automation and data science initiatives stand out in France at 39%.

The same areas feature prominently when businesses are asked how avoided overspend would be redeployed. Among firms experiencing higher-than-expected spending linked to opaque, unpredictable or difficult-to-forecast provider charges, 37% said they would invest the recovered funds in AI, automation or data science initiatives. A further 31% would invest in new technology, software or platforms, 31% would improve operational processes or productivity, and 31% would hire additional staff in technology, data, AI or innovation roles. This reinforces the opportunity-cost finding above: the areas most exposed when infrastructure costs exceed expectations are also among those businesses would prioritise if provider-attributable overspend were avoided.

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Figure 17: Share of firms reporting how avoided provider-attributable infrastructure overspend would most likely be used



Source: Cebr analysis of Sapio survey

More innovative firms are more likely to say they would direct recovered funds towards AI, automation or data science, at 40%, and towards R&D or product development, at 27%, while large enterprises are more likely than SMEs to prioritise AI-related investment, at 39% compared with 30%. At a market-specific level the UK shows the strongest response: 49% of affected businesses would direct recovered funds towards AI, automation or data science, and 37% towards new technology, software and platforms.

5.2 Potential additional investment and skills spending

The survey evidence above shows that avoiding provider-attributable infrastructure overspend would release expenditure for a range of productive uses, particularly investment in AI and new technology, workforce development and specialist hiring. In this section, we translate these stated intentions into economic estimates by applying the survey-based allocation of recovered funds to the national overspend totals estimated in Section 4.3.

ADDITIONAL PRODUCTIVE INVESTMENT

$21.8bn

R&D, AI initiatives and new technology

TRAINING AND WORKFORCE DEVELOPMENT

$7.6bn

Potential reinvestment in skills and upskilling

POTENTIAL ADDITIONAL JOBS

111,450

Full-time equivalent roles supported

Across the eight markets, Cebr estimates that avoiding provider-attributable infrastructure overspend could unlock around **$21.8 billion, roughly a third of total overspend, in additional capital-**

forming investment, meaning expenditure on R&D, AI initiatives and new technology that adds to firms' productive capacity. A further $7.6 billion could be redirected towards training and workforce development, while the funds allocated to hiring could support approximately 111,450 additional full-time equivalent jobs.[6]

The survey also provides a useful indication of the scale of firms' stated hiring ambitions. Among respondents who said they would use recovered expenditure to hire additional technology, data, AI or innovation staff, the average reported hiring intention was around **69 full-time employees over the next two years**. Around 39% said they would seek to hire more than 50 employees, including 12% expecting to hire more than 200. These figures are not used in the employment modelling, but provide an independent survey-based indication that the potential hiring response could be material.

Table 1: Estimated productive uses of avoided infrastructure overspend, by market.

Market	Capital-forming investment unlocked ($bn)	Training and skills investment unlocked ($bn)	Potential additional FTEs
UK	1.9	0.8	8,235
US	10.3	3.0	35,137
France	1.8	0.7	14,380
Germany	2.9	1.1	10,878
Italy	1.2	0.4	8,670
Japan	2.9	1.2	29,742
Australia	0.8	0.3	3,199
New Zealand	0.2	0.1	1,209
Eight-market total	**21.8**	**7.6**	**111,450**

Source: Cebr analysis of Sapio survey and national labour-market data.

The scale of the opportunity varies materially across markets. The US accounts for around $10.3 billion of potential capital-forming investment and approximately 35,100 additional FTEs, while Japan records the second-largest employment effect at around 29,700 FTEs. These differences reflect the size of each market's avoidable overspend pool, businesses' stated preferences for reallocating recovered funds, and country-specific employment costs. The results therefore capture both the scale of the underlying cost pressure and the different ways in which recovered expenditure could translate into investment, skills and employment.

5.3 The wider economic opportunity

Cebr estimates that redirecting avoidable infrastructure overspend into productive investment could be associated with a long-run GDP uplift of around $20.4 billion across the eight markets. Across the full sensitivity range, the estimated uplift is between $13.6 billion and $27.2 billion, depending on the assumed relationship between additional investment and long-run output.

These estimates are driven by the **$21.8 billion in additional capital-forming investment** identified in the previous section, comprising expenditure that businesses report would otherwise be directed towards R&D, AI and new technology. For each market, this additional investment is measured

[6] The modelling does not assume that all recovered expenditure is reinvested: a share is retained for other uses identified by respondents, including cost reduction, margin protection and passing savings on to customers.

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relative to the existing non-residential investment base, producing an implied uplift in investment of around 0.2% to 0.5%.[7]

The analysis is intentionally narrower than the full economic value identified in the previous section. Expenditure redirected towards training, hiring and other uses is excluded from the GDP calculation because these categories do not map directly onto the fixed-investment measures used in the empirical literature.

Table 2: Estimated long-run GDP uplift associated with additional productive investment

Market	GDP uplift - central scenario ($bn)
UK	1.9
US	10.0
France	1.5
Germany	2.8
Italy	1.1
Japan	2.3
Australia	0.6
New Zealand	0.2
Total	20.4

Sources: Cebr analysis of Sapio survey, OECD and World Bank data.

Importantly, the results are long-run scenario estimates rather than forecasts of an immediate annual GDP gain. The model considers a single year's reduction in provider-attributable overspend and asks what the associated increase in productive investment could ultimately imply for the level of output once that capital has been deployed and its effects have worked through the economy. In practice, investment would be implemented over time, productive capacity would adjust gradually, and the timing and persistence of any GDP effect would depend on factors not modelled here, including investment lags, depreciation, financing conditions, complementary labour and skills, productivity spillovers and the extent to which the additional investment genuinely adds to, rather than displaces, other planned expenditure. The estimates should therefore be read as an indication of the potential scale of the foregone long-run economic opportunity under the stated assumptions, not as a prediction that GDP would rise by the estimated amount in the following year.

[7] The model then applies a long-run investment-to-output elasticity of **0.15** in the central case, with **0.10 and 0.20** used as lower and upper sensitivity assumptions. More details are provided in Section 8 (Methodology).

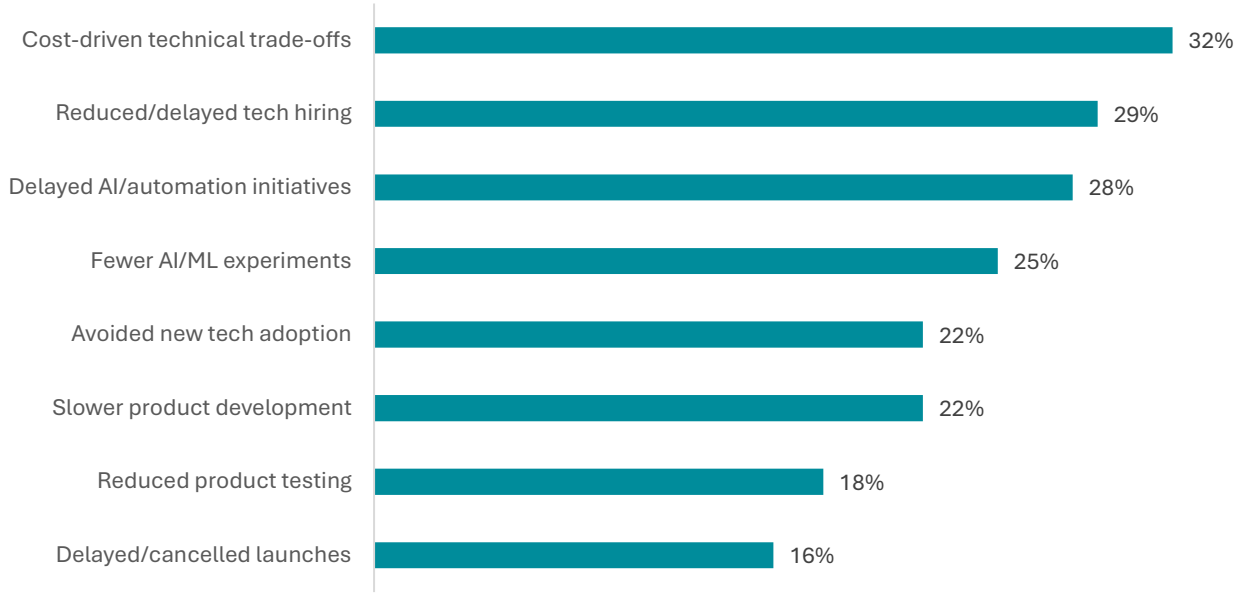
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6. The innovation cost of infrastructure friction

6.1 Innovation and operational trade-offs

Infrastructure pressures are already shaping business decisions. **Figure 18** shows how infrastructure cost pressures and unpredictability influence a range of operational and innovation decisions. Almost one-third of businesses report making technical or architectural decisions based on cost constraints rather than what they considered optimal. 29% say they have reduced or delayed planned hiring in technology, data, AI or innovation roles, while 28% have delayed or scaled back an AI, automation or data science initiative.

Figure 18: Share of firms reporting operational or innovation decisions affected by infrastructure constraints



Source: Cebr analysis of Sapio survey.

Greater cost pressure is associated with sharper innovation trade-offs. Among firms experiencing moderate or significant budget pressure from unpredictable infrastructure costs, 36% have delayed or scaled back an AI initiative, compared with 20% among those experiencing little or no pressure. The same group is also around 10 percentage points more likely to have reduced or delayed specialist hiring and 12 percentage points more likely to make technical or architectural decisions based on cost rather than what they considered optimal.

Infrastructure constraints are also affecting day-to-day business performance. Across the operational issues tested, around one in five to one in four businesses experience them often or very often, including additional costs from fragmented infrastructure or data environments at 26%, restricted or delayed access to data at 25%, and delays caused by limited hardware or compute capacity at 24%. These pressures are more pronounced in the US, where restricted data access rises to 38%, unexpected provider or platform downtime to 37%, and additional costs from fragmented infrastructure to 36%.

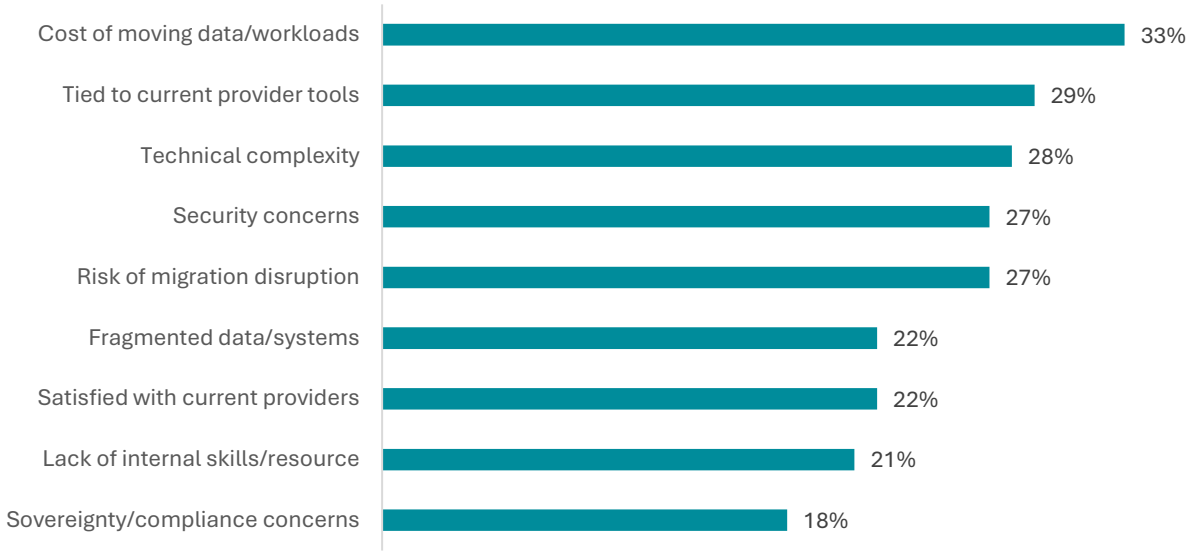
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Fragmentation is associated with more constrained technology choices. Among firms that frequently experience additional costs from fragmented infrastructure, 37% report making technical or architectural decisions based on cost constraints rather than what they considered optimal, compared with 27% among firms that rarely or never experience fragmentation.

Switching provider or technology is not always an easy route out of these constraints. This is particularly apparent among businesses already lagging their peers on innovation. Some 44% of less innovative firms report that their existing infrastructure makes it fairly or very difficult to switch providers, use new tools or adopt better technology, twice the 22% recorded among more innovative firms. This points to a potentially reinforcing pattern in which businesses further behind on innovation also face greater difficulty changing the infrastructure supporting them.

The barriers to switching combine direct costs, technical lock-in and operational risk. Among businesses experiencing switching difficulties, the cost of moving data or workloads is the most commonly reported barrier, cited by 33%, followed by applications, AI tools, databases or workflows being tied to current providers at 29%, and the technical complexity of migration at 28%, as shown in Figure 19.

Figure 19: Main barriers to switching providers, moving data or adopting alternative tools



Source: Cebr analysis of Sapio survey

More innovative businesses appear to face a different form of infrastructure lock-in. While the cost of moving data or workloads is the most common barrier overall, innovation leaders are more likely to report constraints linked to complex and interconnected technology environments. Among more innovative firms, 32% say applications, AI tools, databases or workflows tied to existing providers make switching difficult, compared with 23% of less innovative firms, while 26% cite fragmented data across systems compared with 16%. By contrast, less innovative businesses are much more likely to be held back by internal capability, with 29% citing a lack of skills or resource compared with 16% of more innovative firms.

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6.2 A reinforcing cycle of infrastructure friction

Firms facing greater switching friction are also more exposed to cost uncertainty. Businesses that find it difficult to switch providers, use new tools or adopt better technology are more likely to report material budget pressure from unpredictable infrastructure costs. Among firms finding switching fairly or very difficult, 31% report moderate or significant budget pressure from unpredictable costs, compared with 18% among firms that find switching fairly or very easy.

Cost pressure also appears to shape the technology choices firms are able to make. Around 40% of businesses attributing at least half of their overspend to opaque or unpredictable provider charges report making technical or architectural decisions based on cost constraints rather than what they considered optimal, compared with 21% among firms reporting no provider-attributable overspend.

Frictions are pervasive rather than manifesting in a specific manner. Across all responding firms, around a quarter of businesses report encountering each of the following problems often or very often: additional costs caused by fragmented infrastructure or data environments (26%); restricted or delayed access to data needed for a project or decision (25%); delays caused by lack of access to suitable hardware or compute capacity (24%); duplicated work from poor integration (23%), difficulty moving data between platforms, capacity delays and unexpected downtime (all 21%). Fragmentation-driven cost is the most widespread: 60% of businesses encounter it at least sometimes and only 11% never do.

Considering the above, alongside the wider evidence on fragmentation, delayed AI initiatives and switching barriers, the results point to a reinforcing cycle in which **cost unpredictability, infrastructure lock-in and constrained technology choices can accumulate, making it harder for some firms to invest, adapt and close the innovation gap.**

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7. What the future holds

Written by Wasabi's President and Chief Operating Officer, Marty Falaro

This report, in drawing together a huge amount of evidence and analysis, ultimately reveals an essentially simple cycle of innovation limitation.

Businesses are very frequently experiencing unplanned overspending on their infrastructure. Overspend directly saps budget from the pots earmarked for technology investment. Innovation initiatives – and especially AI initiatives – are therefore slowed or cancelled. Billions of dollars that could be directed into capital-forming investment are lost. And that keeps businesses stuck with infrastructure that limits their ability to keep budgets predictable.

This is a story which has been experienced by businesses everywhere, but in a way that is split across teams and projects, not seen and understood as a complete picture. This research brings that picture into focus.

Of particular interest to us at Wasabi is how significant the share of overspend that businesses attribute to provider charges is. The unpredictability that underpins the cost of innovation that this report identifies is highly complex. No single change or strategy will fix it, and perfect alignment between planned and actual costs is not a realistic goal.

However, provider charges do not need to be obscure or pose unexpected burdens on businesses. Their unpredictability is not a natural consequence of the technology services providers are offering, but an effect of their commercial decisions and the nature of the fine print in the contracts they make with customers. The investments required to make modern enterprises run can and should be transparent.

We could have based our economic impact calculations on total unexpected overspending, which would have produced even larger figures. Instead, we took a more conservative approach, focusing only on the overspend businesses attribute to provider charges. Even on that basis, the economic impact is striking, reaching a scale comparable to annual global investment in AI. This finding, we feel, validates Wasabi's approach of charging for storage – not fees, lock-in costs, or data movement add-ons, but a clear rate based on what customers actually store and access.

Unplanned overspend has real consequences for businesses affected by it – which is to say, the clear majority of SMEs and large enterprises. It also has palpable effects at a much wider, societal level. Productive investment, upskilling, and job creation are what economies need in order to grow at the highest level.

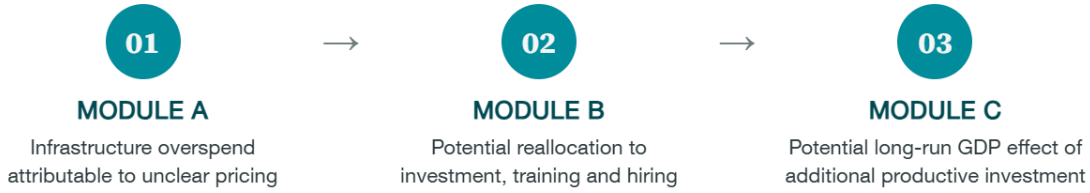
Hopefully, by shining a light on the cost of innovation, we can help to motivate changes that will make innovation more effective, efficient, and accessible for every business.

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8. Methodology

8.1 Scope and analytical framework

The analysis addresses two principal questions. First, it estimates the extent to which businesses are overspending on cloud and technology infrastructure, including storage, compute, networking, data and databases, AI/ML infrastructure, and hardware, as a result of provider pricing that is unclear or difficult to predict. Second, it assesses how any expenditure recovered from this overspend could be reallocated between R&D and technology investment, staff training and hiring, and what is the wider economic opportunity that could instead be created from this investment.



The modelling framework is structured across three sequential modules. Module A estimates the value of infrastructure overspend attributable to unclear pricing. Module B estimates how this expenditure could be reallocated across R&D and technology investment, staff training and hiring. Module C then estimates the potential wider economic effect associated with the capital-forming investment identified in Module B.

8.2 Estimating infrastructure overspend

Module A establishes the core national overspend estimate that underpins the remainder of the modelling. The national overspend estimates are derived from survey evidence collected across eight countries: the UK, US, France, Germany, Italy, Japan, Australia and New Zealand. Results are estimated separately for SMEs and large businesses. For the purposes of this analysis, SMEs are defined as businesses with 10 to 49 employees, while large businesses are defined as those with 250 or more employees.

For each of the six technology infrastructure layers, the calculation uses three survey inputs: total expenditure, the reported overspend rate, and the share of overspend attributed to provider-related reasons such as opaque fees and unclear pricing. These inputs are combined in two stages. First, the reported overspend rate is used to estimate the monetary value of overspend. Second, this is adjusted by the proportion attributed to provider-related unclear pricing to estimate avoidable overspend.

The calculation is based on the median, or typical, firm rather than the arithmetic mean. This approach reduces the influence of a relatively small number of very high-spending businesses, which could otherwise distort the estimated expenditure profile of the wider respondent base, as described in Section 2. In instances where survey sample sizes for specific country and firm size combinations were insufficient, average data across the average firm size for all countries was leveraged.

The resulting per-firm estimates are then scaled to national level using official business population counts for the corresponding country and size category, drawing on publications by their respective national statistical agencies.

As part of the model-development process, a simpler scaling approach was also tested, based on multiplying average per-firm overspend directly by the full national business population. This

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produced an implausibly high estimate. The result reflected the fact that the survey sample is weighted towards larger and more digitally mature businesses and is therefore not representative of all firms on a simple per-business basis. The final methodology instead applies the population-scaling approach described above, which accounts for differences in business size and uses the typical firm within each relevant segment.

8.3 Estimating the potential reallocation of recovered expenditure

Module B takes the national overspend estimates from Module A and estimates how this expenditure could be reallocated if recovered. Once the national overspend estimate has been established for each country and business-size segment, the analysis considers how businesses could reallocate this expenditure if it were recovered. The Module A overspend estimate for each country and size band forms the total expenditure pool used in this stage of the analysis.

Survey respondents were asked how they would use funds released through a reduction in overspend. The response categories included R&D, AI and new technology; staff training; hiring; and other uses, such as reducing costs or passing savings on to customers. As respondents were able to select more than one option, the reported response shares sum to more than 100%.

To derive an allocation across the uses of interest to the modelling, the response shares for R&D and technology, staff training, hiring, and a residual "other uses" category are rescaled together so that all four sum to 100% relative to one another. The residual is deliberately kept in this calculation to avoid inflating the three categories of interest. This provides an estimate of the proportion of expenditure allocated to each use, though only the R&D/technology, training, and hiring shares are carried forward into the investment and hiring estimates that follow.

These rescaled shares are then applied to the overspend pool for each country and business-size segment. This produces separate monetary estimates for expenditure redirected towards R&D, AI and new technology, which is treated as capital-forming investment, and expenditure directed towards staff training, which is treated as skills investment rather than capital investment.

For hiring, the allocated expenditure is converted into an estimated number of additional employees using country-specific employment cost assumptions. These are based on technology-sector salary data from the ONS for the UK, BLS for the US, Apec for France and the Bundesagentur für Arbeit for Germany. For Italy, Japan, Australia and New Zealand, OECD *Taxing Wages* data are used. This data is less technology-sector specific: figures are therefore adjusted using an estimated technology-sector wage premium of 1.4 derived from the average ratio observed in France, Germany and the US. This reflects the higher average wages associated with technology-sector workers, compared to economy-wider averages.

8.4 Estimating the wider economic effect of recovered investment

Module C estimates the potential wider economic effect associated with redirecting a proportion of infrastructure overspend towards productive investment, specifically R&D, AI and new technology.

The analysis is framed as an opportunity-cost assessment. It should be noted that it does not assume that current infrastructure overspend results in an equivalent reduction in GDP. Rather, it estimates the potential economic value associated with productive investment that businesses report could otherwise have taken place in the absence of this overspend.

Only the capital-forming component of Module B is carried forward into Module C. This comprises expenditure that businesses report would be redirected towards R&D, AI and new technology. Expenditure allocated to training, hiring and other uses is excluded from this stage of the analysis,

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as these categories do not correspond directly to the fixed-investment measures used in the empirical literature underpinning the modelling.

The calculation is undertaken in three stages. First, for each country, the estimated additional capital-forming investment identified in Module B is expressed as a proportion of the country's existing non-residential fixed investment. The baseline investment measure is derived from OECD gross fixed capital formation data, with the latest available observations adjusted to the modelling year where required. This provides an estimate of the scale of the potential investment uplift relative to the existing national investment base.

Second, the resulting proportional increase in investment is combined with an assumed long-run investment-to-output elasticity. This parameter captures the estimated relationship between changes in productive investment and changes in economic output identified in the empirical literature.

Third, the implied proportional effect on output is applied to each country's GDP to derive an indicative monetary estimate of the potential long-run GDP effect.

The empirical literature provides consistent evidence of a positive relationship between productive capital accumulation and economic output, including for ICT-related capital. IMF research examining the long-run relationship between gross capital formation and GDP finds that a 1% increase in gross capital formation is associated with an increase in GDP per capita of approximately 0.15%.[8]

A wider body of evidence supports the use of an elasticity in this range. Vollrath (2024) estimates aggregate output elasticities with respect to capital of approximately 0.11 to 0.26, depending on the period and definition of capital adopted.[9] At the firm level, Dhyne et al. estimate an ICT-capital output elasticity of approximately 0.11.[10] Cross-country evidence from Niebel (2018) and Tsachtsiris et al. (2022) also identifies economically significant returns to ICT capital, while Bassanini and Scarpetta (2001) estimate a larger long-run relationship between physical-capital accumulation and GDP per capita across OECD economies. On the basis of this evidence, the modelling applies an investment-to-output **elasticity range of 0.10 to 0.20, with a central assumption of 0.15.** The three assumptions should therefore be interpreted as scenario parameters rather than as direct estimates taken from three individual studies. The available literature does not provide a single elasticity corresponding exactly to the specific reallocation of expenditure modelled here.

Baseline GDP and investment data are drawn from published World Bank and OECD sources respectively, rather than estimated within the model, consistent with the treatment of macroeconomic baseline data throughout the analysis.

8.5 Sensitivity and robustness testing

The modelling approach adopted across Modules A to C was subject to a series of alternative specifications and diagnostic checks. These tests were used to assess the sensitivity of the results to alternative assumptions and to identify specifications that generated unstable or economically implausible estimates.

For Module A, we tested alternative approaches to national scaling, including the use of mean rather than median per-firm overspend and direct scaling of survey averages to the full business population. These approaches produced materially higher estimates, reflecting the influence of a relatively small

[8] IMF working paper WP/16/53

[9] Vollrath, Dietrich. 2024. "The Elasticity of Aggregate Output with Respect to Capital and Labor." *American Economic Journal: Macroeconomics* 16

[10] E. Dhyne, J. Konings, J. Van den bosch & S. Vanormelingen, The Return on Information Technology: Who Benefits Most?

number of high-spending firms and the fact that survey respondents are, on average, larger and more digitally intensive than the wider business population. The adopted methodology therefore uses median per-firm values within each relevant segment and scales these against official business population counts.

For Module B, we tested both respondent-level and population-based approaches to allocating recovered expenditure across investment, training and hiring. These alternatives produced either highly unstable ratios at the respondent level or implausibly large aggregate estimates when survey-derived per-firm figures were scaled directly to national populations. The final approach instead applies segment-level allocation shares to the validated overspend estimates produced in Module A.

The employment estimates were also cross-checked against an alternative population-based approach, drawing from questions on intended hiring in the survey, then scaled up to the relevant business population. This produced materially higher implied hiring than the expenditure-based method and was therefore not retained. The adopted approach converts the expenditure allocated to hiring into headcount using country-specific employment cost assumptions.

For Module C, uncertainty is addressed through low, central and high elasticity assumptions rather than through a single point estimate. This reflects the fact that the empirical literature provides a range of plausible relationships between productive investment and output.

These sensitivity tests are not presented as separate results in the report, but were used to inform the final specification and to confirm that the adopted methodology produces estimates that are stable and economically plausible.

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