



Catalyzing economic growth through capital investment in GenAI



Economic impact of AI: This EY-Parthenon macroeconomic article series provides insights on the economic potential of GenAI and actionable considerations. [Discover more](#)



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In this installment, we delve into the realm of capital investment in generative AI (GenAI). As GenAI has emerged as one of the key components of economic impact, business leaders today find themselves at a crossroads. The October 2023 [EY CEO survey](#) indicates a striking dilemma: while a significant 62% of business leaders acknowledge the urgency of acting on GenAI to prevent competitors from gaining a strategic edge, an almost equal percentage (61%) express reservations due to the uncertainties surrounding the formulation and execution of an AI strategy.

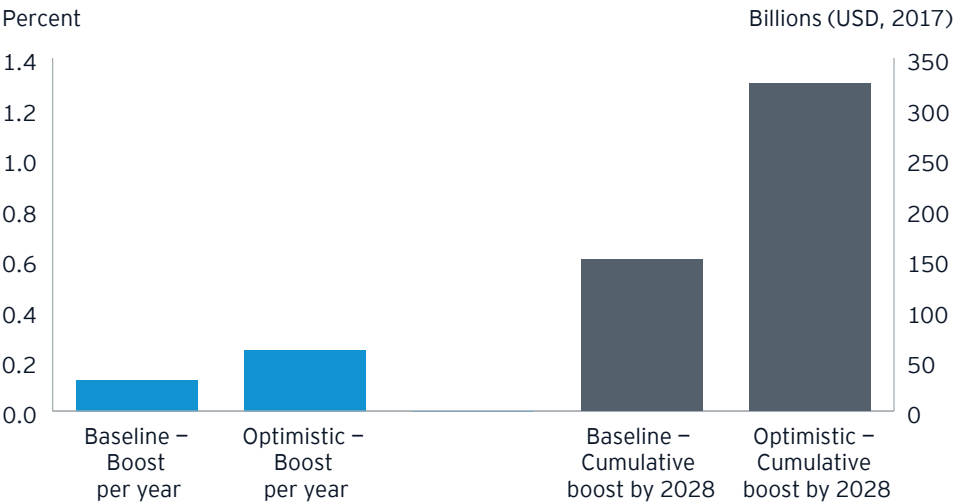
The survey further reveals an “adoption paradox.” It highlights that two-thirds of organizations that have successfully launched at least one AI initiative anticipate that AI will revolutionize their entire business and operational models within a mere two-year span. In contrast, organizations with more extensive AI experience, defined as those having completed five or more AI-related initiatives, project a more cautious timeline of three to five years for AI to wield similar transformative effects.

This disparity in expectations underscores the presence of “unknown unknowns” in AI adoption, particularly in determining the nature and extent of capital investment required for laying a robust AI foundation.

In assessing the potential economic impact of GenAI from a capital investment perspective, we examined the near-term boost to growth from increased investment in research and development, infrastructure, software creation and company adoption. Drawing parallels with the IT revolution in the period of 1980-2000, our two main findings are:

- ▶ **Significant boost to demand:** Assuming trend growth around 8.5% in investment categories where GenAI will be most significantly captured, we estimate that capital investment in GenAI will contribute about 0.1 percentage points (ppt) to US GDP growth annually over the next five years. Our baseline, however, is that business investment will likely be 25% faster, leading to an incremental boost to short-term growth of 0.1 percentage points of GDP per year, worth over \$150bn after five years. A more optimistic scenario could see 50% faster business investment growth, leading to an incremental boost to short-term growth of 0.2ppt of GDP per year, worth a cumulative \$325bn by 2028.
- ▶ **Long-term boost from supply:** In our baseline where business investment is 25% faster than the current trend growth, the potential growth rate of the economy would rise by 0.1ppt per year in the 2028-2033 period, lifting real GDP by nearly 1% over the baseline by 2033, or the equivalent of a \$250bn boost over a decade. Assuming capital investment in AI technology grows 50% faster than the 2017-2022 trend pace over the next five years, the annual capital contribution to long-term GDP growth in the 2028-2033 period would rise by 0.2ppt. This stronger tech-driven trajectory would lift real GDP by more than 2% over the baseline by 2033, or the equivalent of a \$500bn boost over a decade.

US Real GDP boost from GenAI investment



Source: Bureau of Economic Analysis; EY-Parthenon

Additional chart notes: This chart shows the GDP boost from GenAI investment on an average annual basis between 2023 and 2028 as well as the cumulative boost over the same time frame; both include baseline and optimistic scenarios. Baseline assumes business investment in categories where GenAI will be most significantly captured is 25% faster than trend growth; optimistic assumes business investment in categories where GenAI will be most significantly captured is 50% faster than trend growth. Data from this chart is discussed in the article

Looking across major economies, the contributions from greater GenAI investment could also be significant. While the US market is likely to remain the leader in GenAI technologies investment, China and Europe will be following closely behind. We estimate that the lift to global GDP could total between \$300bn and \$600bn over the next five years. The boost to global potential GDP could amount to between \$500bn and \$1tn over the next decade.

In this installment of our “Economic impact of AI” series, we will focus on the business investment and capital accumulation dimension and leave the productivity dimension of accelerating processes, optimizing operations and unlocking new capabilities to the next article in our series.

We will discuss investment in GenAI and associated capital accumulation by taking a deeper look at the following:

- Back to basics: demand and supply
- The demand perspective: near-term contribution of capital investment in GenAI to GDP
- The supply perspective: a strong capital foundation to promote more sustainable growth

1. Back to basics: demand and supply

Capital investment in GenAI can spur stronger capital accumulation and productivity, boosting the global economy's growth rate.

In an era where technological innovation is the cornerstone of economic prowess, GenAI has the potential to reshape the contours of businesses and the broader economy. This installment delves into the burgeoning role of increased capital investment in AI, underscoring its potential to be a significant driver of near-term economic growth.

It's important to consider that GenAI investment is not just a technological upgrade but a strategic economic lever to redefine business models, markets, industries and the very fabric of the global economy. By dissecting the dynamics of AI investment, we aim to unveil how it can propel economic activity, observed through the dual prisms of demand and supply.

From the demand perspective, investment in GenAI is seen as a new frontier for capital allocation, influencing various sectors from health care to finance, and energizing them with innovative capabilities. The investment fuels the industries it permeates, leading to an uptick in overall economic activity and consumer demand.

On the supply side, investment in AI will be a catalyst for stronger capital accumulation as well as productivity growth, lifting the global economy's potential growth rate.

As we noted in the first installment of our series, prior general-purpose technologies have had a significant impact on economic activity, but that impact has generally lagged.

Some of the main reasons for that lag are implementation and diffusion delays, learning and adjustment periods due to the time it takes to effectively use new technologies and delays in the development of complementary innovations or infrastructure for the technology to be fully effective.

To establish GenAI as a cornerstone of modern industry, substantial capital investment may be required.

- ▶ **Research and development (R&D):** Building and refining AI models necessitate a significant influx of resources. The data-intensive nature of GenAI calls for investment in gathering, storing and processing data, as well as in the computational power needed to train sophisticated models.
- ▶ **Infrastructure providers:** Investment in the physical and digital infrastructure necessary to support AI technologies forms another cornerstone of this economic transformation. This encompasses everything from data centers to advanced networking capabilities and even cybersecurity. The adequacy of this infrastructure directly impacts the efficiency and effectiveness of AI solutions.
- ▶ **Software creation:** The investment in AI applications across various business sectors is perhaps the most visible aspect of AI's economic influence. From finance to manufacturing, AI applications are revolutionizing traditional business processes, enhancing customer experiences and opening new revenue streams. These investments are not merely about automating routine tasks but are also about leveraging AI to uncover insights, predict trends and create more personalized and efficient services.
- ▶ **Corporate adoption:** It's essential for businesses to invest in integrating GenAI into their operations. This includes not only the technology itself but also the training of personnel and restructuring of processes to fully capitalize on AI's potential. The widespread adoption of AI by businesses could have a notable economic impact as it leads to increased operational efficiencies, reduced costs and enhanced competitive capabilities. Moreover, as AI becomes more ingrained in business operations, it will likely drive the demand for skilled workers and AI-related services, and, consequently, it will probably stimulate job creation and economic activity in related sectors.



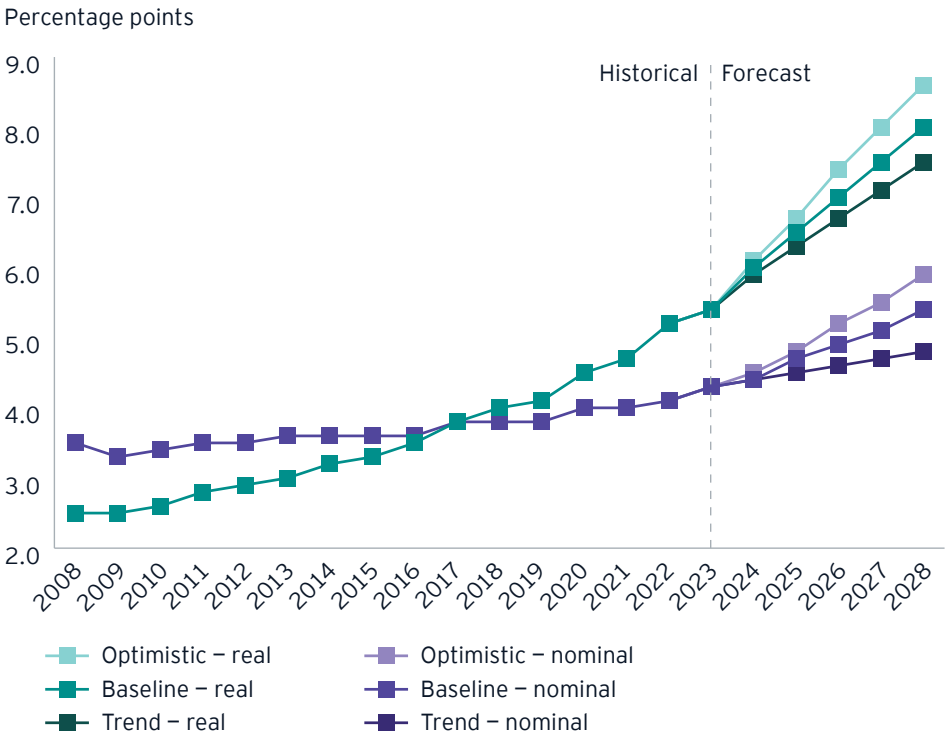
2. The demand perspective: near-term contribution of capital investment in GenAI to GDP

Rising capital investment in GenAI is positioned to increase quickly and prompt GDP growth.

In assessing the potential economic impact of GenAI from a demand perspective, it is instructive to draw parallels with the investment dynamics of previous technological revolutions. In the early 1990s, business investment in information processing equipment and software totaled about 3% of GDP, or \$155 billion.

As businesses invested in the physical and human infrastructure necessary to support, implement and reshape business processes in the computer age, that share of investment rapidly grew to 4.5% of GDP, or \$400 billion by the early 2000s.

US business investment in GenAI as a share of GDP (percent)



Source: Bureau of Economic Analysis, EY-Parthenon; author's calculation

Additional chart notes: Trend refers to trend growth around 8.5% per annum in investment categories where GenAI will be most significantly captured. Optimistic assumes business investment is 50% faster than trend growth.



We are likely on the cusp of a similar trend with GenAI, where burgeoning investment in AI technology is poised to increase rapidly and boost GDP growth. Specifically, we isolated the following investment categories likely to capture AI technology:

- Software
- R&D in semiconductor and other electric components manufacturing, other computer and electronic product manufacturing, scientific services and software publishers
- Computers and peripheral equipment
- Communication equipment

Scenario analysis

The categories where new investment in GenAI will be most significantly captured totaled about \$750 billion in 2017, or about 3.8% of real US GDP. By 2022, investment had grown to just over \$1.1 trillion, or about 5.2% of GDP.

- **Trend growth:** Assuming trend growth in line with economic momentum from 2017 to 2022, investment would be expected to grow around 8.8% per year from 2023 to 2028 and represent 7.6% of real GDP by 2028, or \$1.9 trillion. While this would mean that investment in AI technology would contribute about 0.4ppt to GDP growth per year, it would not represent an increase in the growth contribution relative to recent past.
- **Baseline expectations:** If, instead, we assume that nominal capital investment in AI technology grows 25% faster than the 2017-2022 trend pace over the next five years, then investment represents 8.1% of real GDP by 2028, or \$2 trillion. This would translate into an incremental contribution of GenAI technology investment to GDP growth of 0.1ppt per year (for a total contribution of 0.5ppt) and, by 2028, a boost to real GDP worth \$150bn, or 0.6%.
- **Reason for optimism:** Still, there may be reason to be even more confident about the outlook. Assuming capital investment in AI technology grows 50% faster than the 2017-2022 trend pace over the next five years – which is akin to the acceleration in business investment in information processing equipment and software in the late 1990s – then investment would grow about 11% annually from 2023 to 2028 and represent 8.7% of GDP by 2028, or \$2.1 trillion. This would constitute an incremental short-term contribution to GDP growth of 0.2ppt per year (for a total contribution of 0.6ppt) and, by 2028, a boost to real GDP worth \$325bn, or 1.3%.

The potential uplift to global GDP from increased GenAI investment could also be substantial. With the US expected to continue leading in GenAI technology investment, closely followed by Europe, Japan and China, global GDP could see an augmentation of between \$300 billion (in our baseline scenario) and \$600 billion (in the optimistic case) over the next five years. This significant boost would reflect the accelerated adoption and integration of GenAI technologies across major economies, underlining the transformative impact of AI.

3. The supply perspective: a strong capital foundation to promote more sustainable growth

Past tech disruptions and our scenario analysis provide a case for optimism about GenAI's ability to drive long-term growth.

At the heart of AI's transformative potential on the supply side of the economy is its capacity to drive greater capital accumulation and stronger productivity growth. Capital investment in AI is not just an expenditure; it's a strategic allocation of resources that acts as the foundation for developing and deploying AI solutions and seeds future productivity enhancements.

While we will delineate the long-term growth implication from GenAI-driven productivity growth in a subsequent [article](#), we believe it is essential to dissect the impact of greater capital accumulation first.

Capital accumulation in AI involves investing in various components such as AI models (through building and refining), physical and digital infrastructure, software, AI applications, and AI integration and adoption. Just like physical capital, these investments in AI technologies act as the foundation that allows for stronger economic potential.

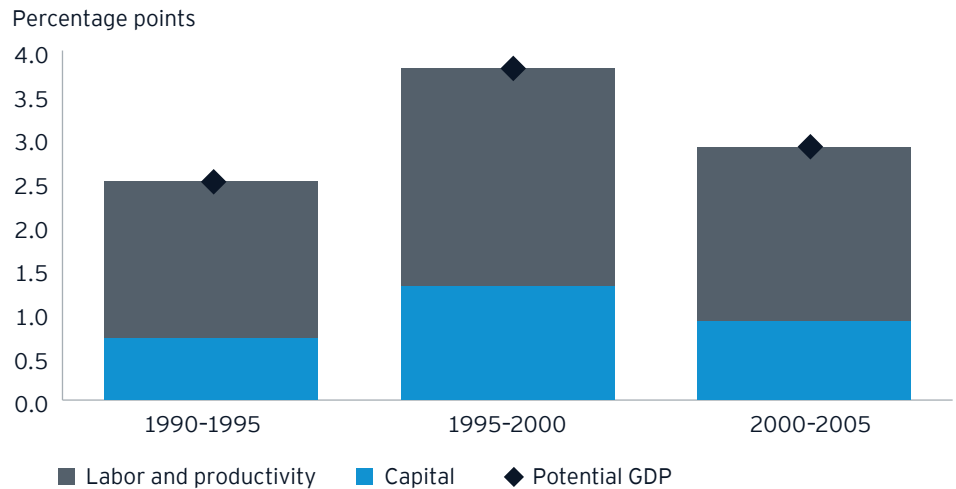
Capturing longer-term impact from greater capital investment in AI technology

The surge in business investment in information processing equipment and software through the 1990s did not just lead to a direct boost to GDP growth, but it also led to increased capital accumulation that then supported stronger long-term GDP growth.

To put things in perspective, the US economy's potential GDP growth rate was estimated to be around 2.5% from 1990 to 1995, but subsequently it accelerated to 3.8% in the 1995-2000 period. Taking all drivers of growth into consideration, the capital contribution to potential GDP growth nearly doubled from 0.7ppt in the early 1990s to 1.3ppt in the 1995-2000 period. At the same time, the contribution of productivity also rose from 1.1ppt to 1.7ppt from 1995 to 2000 and remained elevated around 1.5ppt from 2000 to 2005.

This confirms our findings from [our first installment](#), which indicated a five- to 10-year delay between the development of new technologies and their more sustainable impact on productivity and growth potential.

US Average annual contribution to real potential GDP growth



Source: Bureau of Economic Analysis, EY-Parthenon; author's calculation

Additional chart notes: Trend refers to trend growth around 8.5% per annum in investment categories where GenAI will be most significantly captured. Baseline assumes business investment is 25% faster than trend growth. Optimistic assumes business investment is 50% faster than trend growth.

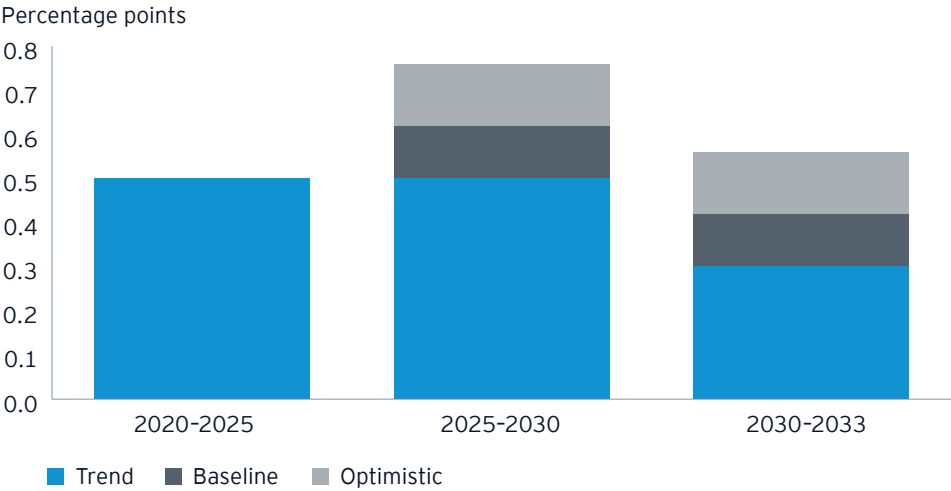
Scenario analysis

Using the same three scenarios, which analyzed the potential short-term economic impact of greater capital investment in AI technologies, we can infer the likely boost to potential GDP growth in the five years from 2028 to 2033.

- **Trend growth:** Assuming business investment in AI technology continues to grow in line with its moderate 2017-2022 trend, the annual capital contribution to long-term GDP growth in the 2028-2033 period would likely be around 0.5ppt.
- **Baseline expectations:** If, instead, we assume that capital investment in AI technology grows 25% faster than the 2017-2022 trend pace over the next five years, the capital contribution to long-term GDP growth in the 2028-2033 period would rise from 0.5ppt annually to 0.6ppt – thereby lifting the potential growth rate of the economy by 0.1ppt. This may appear to be a small difference, but by lifting the economy's potential growth rate, this stronger tech-driven trajectory would lift GDP by nearly 1% over the baseline by 2033, or the equivalent of a \$230bn boost over a decade (\$360bn in nominal terms).
- **Reason for optimism:** As we noted earlier, there is reason to be more confident still about the potential capital accumulation contribution to long-term growth. Assuming capital investment in AI technology grows 50% faster than the 2017-2022 trend pace over the next five years – which is akin to the acceleration in business investment in information processing equipment and software in the late 1990s – the capital contribution to long-term GDP growth in the 2028-2033 period would rise from 0.5ppt annually to 0.7ppt, thereby lifting the potential growth rate of the economy by 0.2ppt. This stronger tech-driven trajectory would lift real GDP by nearly 2% over the baseline by 2033, or the equivalent of a \$475bn boost over a decade.

In the long run, the potential upside to global GDP from greater capital investment could be quite significant. How significant? Factoring stronger investment in Europe, Japan and China and slower investment across emerging markets, we estimate a boost to potential GDP growth worth between 0.5% and 1% by 2033, representing between \$500bn and \$1tn.

US average annual capital contribution to real potential GDP growth



Source: Bureau of Economic Analysis, EY-Parthenon

Additional chart notes: Trend refers to trend growth around 8.5% per annum in investment categories where GenAI will be most significantly captured. Optimistic assumes business investment is 50% faster than trend growth.





Breakdown of AI capital investment across sectors

When thinking about the sector-specific benefits from the GenAI revolution, we often omit the investments that may be required to shift how industries operate. By fostering innovation, enhancing productivity and creating new markets and opportunities, the capital investments described above may be instrumental in driving potential GDP growth.

Retail sector: AI's role in retail is multifaceted, ranging from personalized shopping experiences to inventory management. Capital investments in AI enable retailers to better understand consumer behavior, optimize supply chains and enhance customer service, leading to increased sales and market expansion. This sectoral growth is a key contributor to overall economic development because it could boost retail sector productivity while also stimulating consumer spending, a major component of GDP.

Health care sector: Investment in AI within health care is revolutionizing patient care and medical research. AI-driven tools are being used to enhance diagnostic precision, streamline patient treatment plans and personalize health care services. This not only improves health outcomes but also helps optimize resource utilization, reducing costs and contributing to economic growth. Additionally, AI in health care is spearheading innovations in drug discovery and disease prediction, opening new markets and avenues for growth.

Automotive industry: The automotive sector's investment in AI is pivotal in advancing the development of autonomous vehicles. This not only transforms the concept of transportation but also stimulates investment in adjacent industries like logistics and urban planning. The ripple effects of such advancements could contribute significantly to GDP growth by fostering new business models, enhancing supply chain efficiencies and creating demand in related sectors such as sensor manufacturing and AI-driven navigation systems.

Manufacturing industry: In manufacturing, AI investment focuses on automation, predictive maintenance and supply chain enhancement. This not only increases production efficiency but also improves product quality, reduction of waste and operational costs. The resultant increase in competitiveness and productivity of the manufacturing sector could significantly contribute to GDP growth, while also fostering an ecosystem of innovation and technological advancement.

Financial services: AI investments in financial services are reshaping banking, insurance and investment sectors through enhanced risk assessment, fraud detection and personalized financial planning services. This could increase the efficiency and resilience of financial systems, supporting economic stability and growth.

Energy sector: Investment in AI within the energy sector is pivotal in transforming how we generate, distribute and consume energy. AI technologies are being integrated to help optimize energy production, enhance grid management and facilitate the shift to renewable sources. Additionally, AI applications in predictive maintenance of infrastructure may further boost economic efficiency. The innovations driven by AI in the energy sector are crucial in supporting the transition to a low-carbon economy, promoting sustainable economic development.



Five recommendations for business leaders

By focusing on the following areas, stakeholders can better navigate the complexities of AI capital investments and harness their full potential to drive meaningful business transformation.

Strategic alignment with business goals

- **Insight:** It's essential for AI investments to be closely aligned with the overarching business goals and objectives. This alignment helps ensure that AI initiatives directly contribute to the company's strategic priorities, whether it's improving customer experience, optimizing operational efficiency or driving innovation.
- **Recommendation:** Conduct a thorough analysis to understand how AI can address specific business challenges or opportunities. Establish clear KPIs to measure the impact of AI initiatives on business outcomes.

Leveraging data as a strategic asset

- **Insight:** High-quality, relevant data is the fuel that powers AI systems. The ability of a business to collect, process and analyze data effectively is a critical determinant of AI success.
- **Recommendation:** Prioritize the establishment of a robust data infrastructure and governance model. This may help ensure data quality, accessibility and scalability to support AI initiatives.

Acquiring the right talent and partnering

- **Insight:** Successful AI implementation may require a combination of the right talent, including data scientists, AI engineers and domain experts.
- **Recommendation:** Invest in building internal AI capabilities and work with organizations that can bring the necessary professional skills and knowledge. Continuous training and development programs are crucial to keep the team up to date with the latest AI advancements.

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Fostering a culture of innovation and adaptability

- **Insight:** The fast-evolving nature of AI technology makes it essential for businesses to be agile and adaptable.
- **Recommendation:** Encourage a culture of innovation where experimentation with AI is supported. This involves fostering an environment where learning from failures is seen as a stepping stone to innovation, and where employees are encouraged to think creatively about applying AI to solve business problems.

Understanding and managing risks

- **Insight:** AI projects come with their own set of risks, including data privacy concerns, ethical considerations and potential biases in AI models.
- **Recommendation:** Develop a robust risk management framework that addresses these challenges. This includes investing in data security, helping ensure compliance with relevant regulations and implementing ethical AI practices. But for large-scale transformation to happen, businesses may need to make significant upfront investment in physical, digital and human capital to acquire and implement new technologies and reshape business processes.



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