VOXEU COLUMN | MACROECONOMIC POLICY | PRODUCTIVITY AND INNOVATION

From AI investment to GDP growth: An ecosystem view

Luisa Carpinelli, Filippo Natoli, Marco Taboga / 9 Feb 2026

Forecasts on the economic impacts of artificial intelligence diverge sharply. This column assesses how the current AI wave is contributing to US GDP, both directly through investment and indirectly through ongoing service flows. Technology investment contributes positively to GDP growth, but a sizeable portion leaks abroad through imports. Beyond capital spending, value added in sectoral accounts is also showing the contribution of AI, for example in computer systems design and data processing. The largest economic effects of AI are still likely to come from productivity gains and organisational change. Understanding today's accounting footprint is a prerequisite for interpreting tomorrow's transformation.

AUTHORS

Luisa Carpinelli

Filippo Natoli

Marco Taboga

The extraordinary rise of artificial intelligence (AI) has moved to the centre of policy, market, and academic debate. The key macroeconomic question is whether – and how much – AI will leave a durable imprint on economic growth, productivity, and employment. Model-based insights diverge sharply: Acemoglu (2025) emphasises that automation-heavy AI may depress labour demand and yield only modest aggregate productivity gains, whereas Davidson et al. (2026) highlight the potential for AI to raise long-run growth if it expands effective labour and accelerates knowledge creation. A definitive empirical assessment of the long-run productivity effects of generative AI remains premature, though partial insights can be drawn from earlier technology and AI waves (Gazzani and Natoli 2024, Miranda-Agrippino et al. 2025).

These questions are not new. They echo earlier debates on the productivity payoff of information technology in the 1990s (Brynjolfsson and Hitt 2000) and on the macroeconomic role of intangible capital (Corrado et al. 2005). What is distinctive in the current episode is the sheer scale of investment: AI-related capital expenditure has led some commentators to identify it as a dominant driver of US growth in 2025. In recent work (Carpinelli et al. 2026), we assess the extent to which the current AI wave is already contributing to US GDP. Adopting a deliberately mechanical accounting approach and a short-term horizon, we abstract from second-round effects that may eventually trigger deeper structural change.

Although conjunctural, this assessment is of first-order importance. Quantifying AI's current macroeconomic contribution informs monetary policy, fiscal planning, and financial stability analysis, and helps reconcile strong aggregate US growth with more nuanced sectoral and distributional dynamics. Our study complements related work on the financial-sector implications of AI (Foucault et al. 2025, Kelly et al. 2025) and its labour-market effects (Giuntella et al. 2025, de Souza 2025).

Why data centres sit at the core of the AI economy

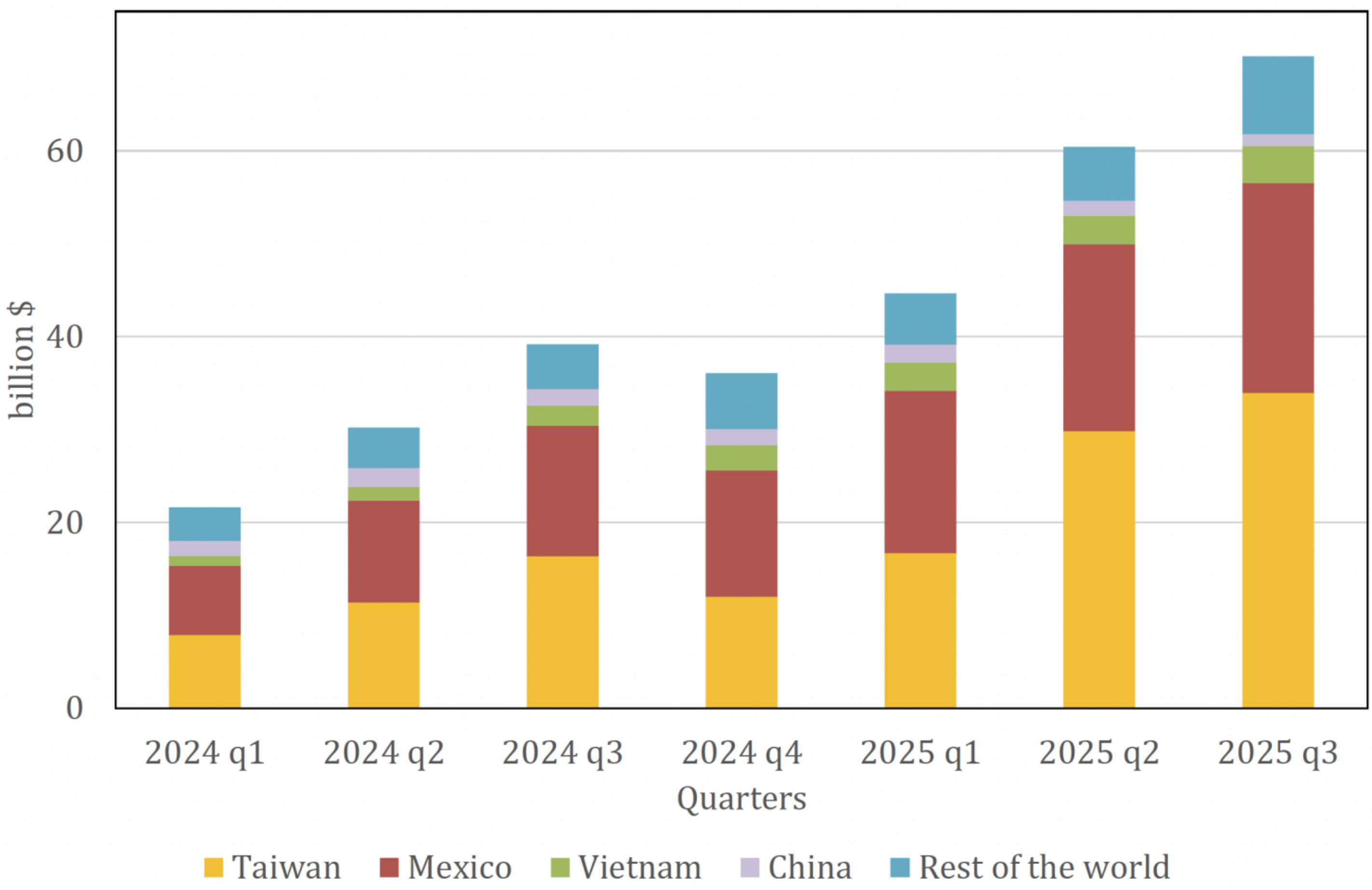
Any macroeconomic assessment of AI should begin with its production ecosystem, which rests on three interdependent actors: hardware vendors, cloud infrastructure providers, and AI labs. Hardware production relies on a fragmented global supply chain (chip design is concentrated in the US, while fabrication, packaging, and assembly largely occur abroad) within a highly concentrated, oligopolistic market. US-based cloud hyperscalers sit at the centre, owning data centres and monetising computation through rental services. AI labs then convert this computing capacity into services sold via application programming interfaces (APIs) or subscriptions.

Together, these actors revolve around the data centre, making AI a capital-intensive, industrial system rather than a purely digital one. This structure shapes how AI maps into national accounts. First, AI contributes through investment in facilities and equipment, boosting demand but adding to GDP only via domestic value added. Second, once operational, data centres generate ongoing service flows that enter GDP as consumption, investment, government spending, or exports.

Investment headlines versus domestic value added

The recent surge in AI-related investment is striking. In 2025, technology investment reached levels unseen in decades, with computer and equipment purchases growing at rates reminiscent of the early personal computer era, prompting claims that AI had become the main engine of US growth. National accounts, however, tell a more nuanced story. The investment boom has been matched by a sharp rise in technology imports, while consumption and exports of tech goods have grown more modestly. This pattern indicates that import growth is largely investment-driven, reflecting reliance on foreign fabrication and server assembly, as illustrated by rising imports from countries such as Mexico and Vietnam, in addition to Taiwan (Figure 1).

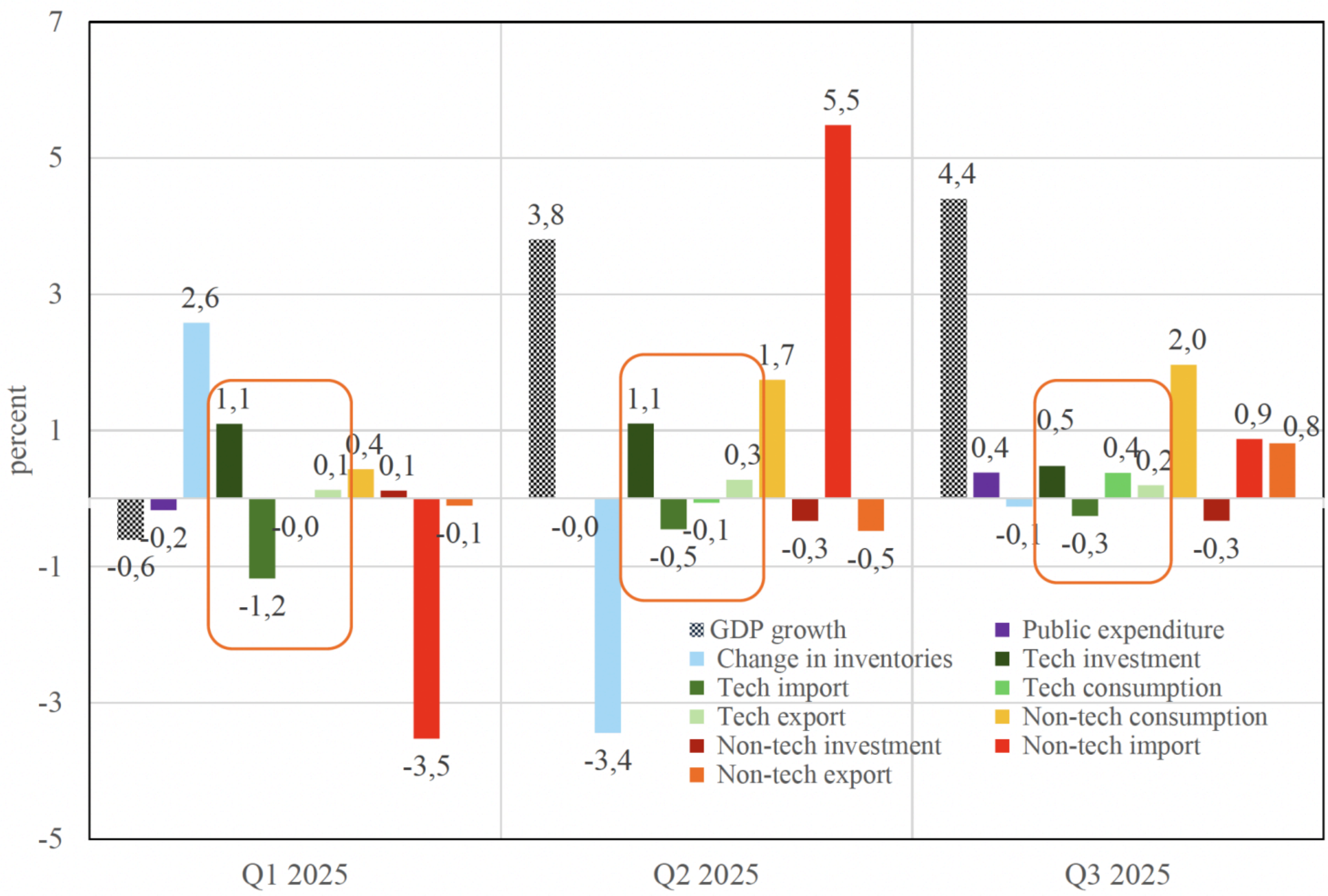
Figure 1 Imports of servers by country of origin



***Source*: Trade Data Monitor.**

As a result, a sizable share of AI investment leaks abroad through imports. Even so, technology investment still contributes positively to GDP growth — but in proportion: AI has complemented, not displaced, traditional growth drivers like household consumption (Figure 2). Interestingly, technology imports in 2025 — unlike non-tech goods — were largely insulated from the front-loading that affected products expected to face tariffs. This contrast is evident in the pronounced swings in non-tech imports and inventories in Q1 and Q2.

Figure 2 Contribution to GDP growth, tech versus non-tech

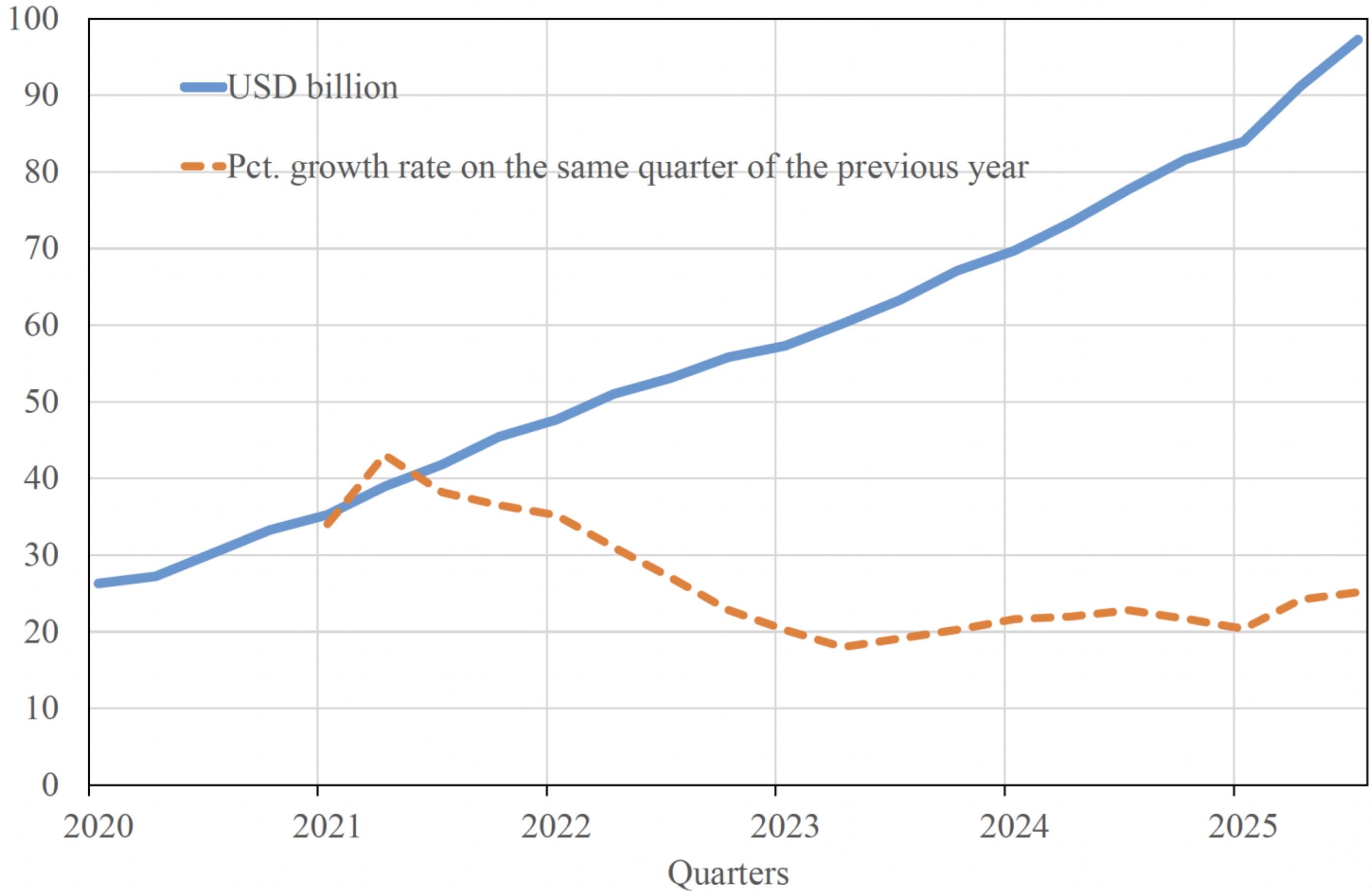


***Source*: Bureau of Economic Analysis.**

From construction sites to cloud revenues

The macroeconomic impact of AI extends beyond capital spending. Once operational, data centres generate streams of computational and AI services sold to households, firms, governments, or foreign users, or used as intermediate inputs that reshape production and productivity. Sectoral accounts already show this effect: value added in computer systems design, data processing, and related services has grown rapidly, helping explain why AI's GDP contribution appears larger on the income side than capital spending alone would suggest. Rising exports of computer services and the strong revenue growth of major cloud providers reinforce this picture. Figure 3 shows that revenues of the three largest public cloud platforms – Amazon Web Services, Microsoft Azure, and Google Cloud – have continued to grow at rates well above 20%. While these revenues reflect more than AI alone, AI workloads are an increasingly important driver, particularly for the newest, GPU-intensive data centres.

Figure 3 Quarterly data centre revenues of the three largest public clouds



Note**: The three largest public clouds are Amazon AWS, Microsoft Azure, and Google Cloud. Revenues generated by these clouds are reported as a separate item in their respective owner companies' financial statements. Source: quarterly financial reports of Amazon, Alphabet (Google), Microsoft, and own calculations.**

This is hardly surprising: high utilisation rates and elevated prices also imply very short payback periods for AI data centres. Using NVIDIA's NL72 as a reference, simple calculations show that building a last-generation AI server rack can cost about $4.5 million, with roughly $200 million per year for electricity and maintenance, while median annual rental prices quoted in October 2025 range between $6 million and $10 million. At these rates, a fully utilised AI facility can recoup its initial investment in under a year. As a result, AI service revenues can contribute to GDP within a few quarters on a scale comparable to the original investment – unlike traditional infrastructure, where payback periods often span decades.

Risks beyond the accounting identity

One often cited concern is the interaction between short hardware lifecycles and sustained reinvestment needs. Short technological cycles and intense physical wear could compress asset lifetimes, inflate reported profits if depreciation is underreported, and structurally raise capex-to-revenue ratios. The short payback periods calculated above, and the redeployment of older hardware, mitigate the severity of the concern that capital cannot be amortised through operating income. Yet they do not eliminate the tension between high gross revenues and more limited net income over time – especially in an industry that requires constant reinvestment, and whose domestic benefits are not commensurate with the scale of expenditure, given the global nature of the AI investment supply chain.

A second, and more fundamental, source of uncertainty lies on the demand side. AI adoption has proceeded at an unprecedented pace, far faster than earlier general-purpose technologies. Forecasting demand when usage has grown by orders of magnitude in just a couple of years is inherently difficult. This creates symmetric risks. Overinvestment could lead to excess capacity, margin compression, and market corrections – the risk that is most often cited by commentators. Underinvestment carries material macro financial risks as well for the current incumbents. It could constrain supply and result in degraded service quality, which could translate into rising prices, and a loss of market share to foreign competitors.

Implications for policy and measurement

Three lessons stand out for policymakers. First, AI has already become macroeconomically relevant, but not in the simplistic sense that 'AI investment equals GDP growth'. Imports matter, and so does the distinction between spending and value added. Second, data centres deserve special attention as the physical nexus linking capital formation, service production, and trade. Third, better measurement is essential. Current national accounts struggle to distinguish AI-specific activity from broader IT categories, obscuring both risks and opportunities.

Looking ahead, the largest economic effects of AI are still likely to come from productivity gains and organisational change rather than from capital spending itself. Yet understanding today's accounting footprint is a prerequisite for interpreting tomorrow's transformation. Without it, debates about bubbles, booms, and breakthroughs risk talking past the data rather than being grounded in it.

Authors' note: This column does not necessarily reflect the views of the Bank of Italy or the European System of Central Banks.

References

Acemoglu, D (2025), "The simple macroeconomics of AI", *Economic Policy* 40(121): 13–58.

Brynjolfsson, E and L Hitt (2000), "Beyond computation: Information technology, organizational transformation and business performance", *Journal of Economic Perspectives* 14(4): 23–48.

Carpinelli, L, F Natoli and M Taboga (2026), "Artificial intelligence and the US economy: An accounting perspective on investment and production", Available at SSRN.

Corrado, C, C Hulten and D Sichel (2005), "Measuring Capital and Technology: An Expanded Framework", in *Measuring Capital in the New Economy*, pp. 11-46, NBER.

Danielsson, J (2025), "Artificial intelligence and stability", VoxEU.org, 6 February.

Davidson, T, B Halperin, T Houlden and A Korinek (2026), "When Does Automating Research Produce Explosive Growth?", mimeo, January.

Foucault, T, L Gambacorta, W Jiang and X Vives (2025), "Artificial intelligence in finance", VoxEU.org, 5 June.

Gazzani, A and F Natoli (2024), "The macroeconomic effects of AI-based innovation", available at SSRN.

Giuntella, O, L Stella and J Konig (2025), "Artificial intelligence and workers' wellbeing: Lessons from Germany's early experience", VoxEU.org, 21 July.

Kelly, B, B Kuznetsov, S Malamud and T A Xu (2025), "Artificial intelligence and asset pricing: The power of transformers", VoxEU.org, 6 April.

Miranda-Agrippino, S, S Hacıoğlu-Hoke and K Bluwstein (2025), "Patents, News, and Business Cycles", *The Review of Economic Studies*, October.

de Souza, G (2025), "Artificial intelligence in the office and the factory: Evidence from administrative software registry data", VoxEU.org, 9 September.

AUTHORS

Luisa Carpinelli
Head of the Advanced Economies and Macroeconomic Policies Division, Bank Of Italy

Filippo Natoli
Deputy Head, Advanced Economies and Macroeconomic Policies Division, Bank Of Italy

Marco Taboga
Head of the International Finance and Commodity Markets Division, Bank Of Italy

THEMES

MACROECONOMIC POLICY PRODUCTIVITY AND INNOVATION

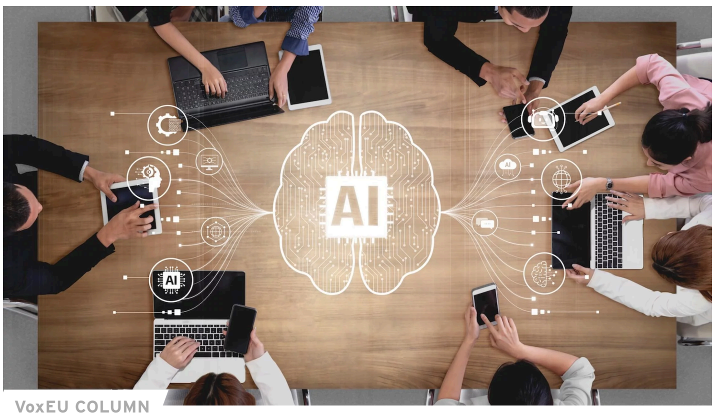
KEYWORDS

ARTIFICIAL INTELLIGENCE GDP GROWTH

SHARE

VoxEU COLUMN

Artificial intelligence in the office and the factory: Evidence from administrative software registry data



VoxEU COLUMN

Generative AI: Uneven adoption, labour market returns, and policy implications

Gustavo de Souza

9 SEP 2025 LABOUR MARKETS / PRODUCTIVITY AND INNOVATION

Leonardo Gambacorta, Tullio Jappelli, Tommaso Oliviero

12 NOV 2025 LABOUR MARKETS / PRODUCTIVITY AND INNOVATION

VoxEU COLUMN

Generative AI in German firms: Diffusion, costs, and expected economic effects

Elisabeth Falck, Arne Nagengast

7 FEB 2026 PRODUCTIVITY AND INNOVATION

THEMES & CURRENT ISSUES

Artificial Intelligence
Business Cycles
Central Banking
Climate Change
Competition Policy
COVID-19
Development & Growth
Economic history
Energy
EU Economic Architecture
Exchange Rates
Finance and Fintech
Financial Markets
Financial Regulation and Banking
Health Economics
Inflation
International Finance
International trade
Labour Markets
Migration
Monetary Policy
Political Economy
Poverty and Income Inequality
Productivity and Innovation
Taxation
Ukraine Initiative
Women in Economics

SIGN UP TO OUR NEWSLETTER

Your email address

SIGN UP

FOLLOW US

Contact Us Cookies Privacy Policy RSS Feeds