Google Cloud Region: Lifting Productivity in the Greek Economy

HELLENIC REPUBLIC Ministry of Digital Policy, Telecommunications and Media · Google Cloud · Access Partnership · αlphaβeta

HIGHER PRODUCTIVITY

The Google Cloud Region in Greece is estimated to contribute a cumulative **USD2.2 billion** to Greece's GDP between 2024 and 2030.

JOB CREATION

Between 2024 and 2030, the Google Cloud Region is estimated to create **19,400** jobs in 2030 alone.

SUPPORTING SMALL BUSINESS GROWTH

Google Cloud eliminates the need for customers to own or operate physical data centers and servers by themselves, supporting growth ambitions of the more than **700,000 micro, small and medium-sized enterprises (MSMEs)** in Greece.

PROMOTING SUSTAINABILITY

Migration of on-premise data centres to Google Cloud would enable organizations to reduce their energy consumption and associated emissions – hyperscale data centers are **5 times less carbon intensive.**

ENABLING INNOVATION

The use of Google's cloud services has supported **advancements in healthcare and scientific research.**

BOOSTING PRODUCTIVITY FOR SMALL BUSINESSES

By 2030, the increase in cloud adoption by micro and small businesses is estimated to **lift productivity by up to 3.5%** in that year.

Accelerated adoption of Google's cloud services by businesses and the public sector will enable cost savings, risk mitigation, and support greater scalability. These effects will help lift private sector productivity, supporting economic growth and job creation, and facilitate more efficient delivery of public services. Google's cloud services could also support broader benefits, including addressing challenges around sustainability, enabling innovation to deliver social impact, and supporting small business growth.

The Google Cloud Region in Greece is estimated to contribute a cumulative USD2.2 billion to Greece's GDP between 2024 and 2030, and support the creation of 19,400 jobs in 2030 alone.

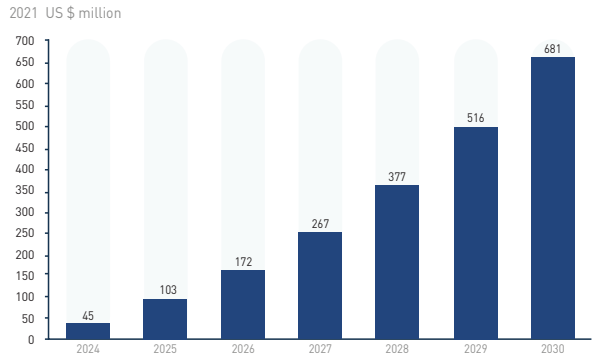
The productivity gains from increased adoption of Google's cloud services across the private sector will contribute to economic growth and employment. These effects will benefit both businesses as well as consumers, who will enjoy cost savings and improved quality on products and services, and real wage growth.

Productivity gains allow businesses to produce more outputs with fewer inputs, which frees up resources for broader investment. This effect, in addition to real wage growth driving higher consumption, will increase the demand for labour – supporting jobs creation.

EXHIBIT 1

The Cloud Region will contribute close to US$2.2 billion to Greece's GDP between 2024 and 2030

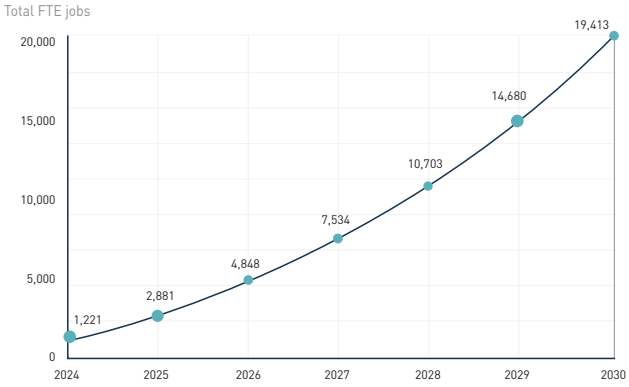
Potential annual productivity impact of adopting Google cloud technologies in Greece



SOURCE: O*NET, OECD, National statistics offices, Alphabeta analysis

The Cloud Region will support the creation of 19,400 jobs in 2030 alone

Potential annual jobs created from adopting Google cloud technologies in Greece



SOURCE: IMF, OECD, National statistics offices, Alphabeta analysis

By 2030, use of Google's cloud services by the Greek public sector would facilitate greater efficiency of service delivery.

Google Cloud adoption by the public sector will enable more efficient delivery of public services. By reducing costs in the public sector, resources in the economy would be freed up and redeployed for more productive uses. More efficient delivery of public services would also lead to better outcomes for citizens, such as in health. Increased investment in cloud technologies by the public sector between 2024 and 2030 is estimated to have an effect equivalent to higher public health spending of around USD139 million.

Google Cloud can promote sustainability by reducing energy use through cloud storage.

Greece has set targets to cut greenhouse gas emissions by at least 55% by 2030 and 80% in 2040, before reaching net-zero by 2050. Migration of on-premise data centres to Google Cloud would enable organizations to reduce their energy consumption and associated emissions. Hyperscale data centers are 5 times less carbon intensive to operate than internal data centers.[1]

Google's cloud services has enabled innovation in healthcare and supported the advancement of research.

CASE STUDY: EMORY UNIVERSITY

Through Google Cloud and the Google App Engine, healthcare workers at Emory University have been able to develop an algorithm to predict sepsis hours before onset.

Google Cloud has been able to provide crucial capacity in handling the large amounts of data, as well as enabling AI-based analysis to predict sepsis. As a result, healthcare workers are able to prioritize their response to patients most at risk.

CASE STUDY: Allen Institute for AI (AI2)

AI2 is a non-profit which conducts complex research and engineering with the goal of making scientific breakthroughs in artificial intelligence. Google Cloud research credits were recently made available to non-profit research in addition to government and academia. With these research credits, AI2 utilises Google's advanced cloud technology offerings to manage and analyse large data sets to further understand AI systems.

[1] Hessam, L. (2022, May 3). Measuring greenhouse gas emissions in data centres: the environmental impact of cloud computing. Climatiq. https://www.climatiq.io/blog/measure-greenhouse-gas-emissions-carbon-data-centres-cloud-computing

Google Cloud Platform can support small business growth.

Google Cloud Platform provides an IT infrastructure solution that is scalable with the growth ambitions of the more than 700,000 micro, small and medium-sized enterprises (MSMEs) in Greece. It eliminates the need for customers to own or operate physical data centers and servers by themselves, which can be cost-prohibitive particularly for MSMEs who often face financial and skills gaps.

Micro-and small businesses are likely to benefit even more from cloud adoption – the increase in cloud adoption by 2030 is estimated to lift productivity in that year by up to 3.5% more than otherwise.[2] More broadly, Google Cloud Platform will provide MSMEs with greater access to technology and help put digitalized MSMEs in a better position to benefit from the potential gains under the Greece 2.0 Plan.

METHODOLOGY

The scope of the economic impact estimates are the catalytic effects of Google Cloud Infrastructure, which are defined to be the impact on GDP due to productivity improvements enabled by the use of Google Cloud Services. It excludes estimates of the economic contribution of building and operating Google Cloud Infrastructure.

The catalytic effects are comprised of economy-wide impacts, with the analysis disaggregating the economy into four sectors. Three are subsectors of the private sector—manufacturing, financial services, and other services—while the fourth is the public sector. The decision to adopt this four-sector disaggregation reflects that the impact of technology adoption on productivity in each of these sectors will differ.

Productivity improvements relate to higher GDP insofar as greater technical efficiency enables private sector firms to produce higher levels of output for the same level of input, and earn higher incomes. On the other hand, public sector productivity is more difficult to measure, as public sector outputs can be intangible and may not have a market value. For the purposes of this analysis, public sector productivity improvements are reflected in a decline in the unit cost of delivering public sector outcomes. That is, should the quality of public sector outcomes remain unchanged, declines in the unit cost of delivering these outcomes reflect greater technical efficiency. The relationship to GDP in the case of public sector productivity improvements reflects an improvement in economy-wide allocative efficiency – resources that would otherwise be deployed in the public sector could otherwise be deployed in the private sector for more productive uses.

ESTIMATING THE IMPACT ON PRIVATE SECTOR PRODUCTIVITY AND JOBS

Productivity in the private sector reflects the overall efficiency with which labour and capital inputs are used together in production. It is measured by changes in the amount of outputs for a given amount of inputs. Increases in the quality of inputs as well as changes in the way in which the inputs are combined for production, such as due to improvements in skills and technology, can lead to productivity growth. There have been various studies that have examined the relationship between technology use and productivity. Gal et. al. (2019) assesses how the adoption of a range of digital technologies affects firm-level productivity. The findings of Gal et. al. (2019) provide evidence of a positive relationship.

The private sector productivity gains are estimated for a three sector disaggregation of the economy – manufacturing, financial services, and other services. The distribution of productivity gains by sector is based on an assessment of the workforce automation potential of each sector. This is determined by mapping the degree of automation of the specific activities undertaken by all occupations within the workforce in each industry, based on the US Department of Labor O*Net database.

The relationship between technology use and productivity is applied to projections of cloud adoption by industries into the future, calculated based on IDC forecasts of expenditure, to estimate the productivity growth attributable to the private sector. The contribution of Google Cloud to this estimate is apportioned using a projected market share of Google Cloud.

ESTIMATING THE IMPACT OF PUBLIC SECTOR EFFICIENCY

Productivity growth in the public sector is typically framed as improvements in the efficiency of delivering public sector outcomes, such as in health, a major area of government expenditure. Improvements in health outcomes in an economy have a relationship with GDP, based on an extensive body of literature. Improvements in health outcomes driven by more efficient public sector delivery are expected to generate productivity gains for the economy, e.g. increased workforce participation, reduced private health spending. An econometric analysis has been used to estimate the relationship between the government spending on ICT and the delivery of public health outcomes. This relationship is found to be positive, and applied to projections of public sector expenditure on cloud into the future based on IDC forecasts of expenditure. The increase in health outcomes attributable to future increases in cloud expenditure (a subset of ICT expenditure) is applied to estimates of the relationship between health outcomes and GDP. The contribution of Google Cloud to this estimate is apportioned using the projected market share of Google Cloud. The equivalent health expenditure required to generate a similar improvement in health outcomes is also estimated. Given that this analysis only focuses on productivity gains arising from improvements in health outcomes, this is likely a conservative estimate of the impact of public sector efficiency.

ESTIMATING GOOGLE'S MARKET SHARE

In the absence of a Cloud Region launch, Google's market share growth is assumed to experience a linear decline (from its historical CAGR) over the next 10 years. This is based on the rationale that market share growth slows as competition dynamic stabilizes in a market. The launch of a Cloud Region will lead to an exponential market share growth for Google for the first two years of launch, fuelled by Google's more intensive marketing efforts, allowing it to gain an edge and increase market share rapidly. Following which, Google's market share growth remains the same as pre-launch. This assumes that marketing efforts by Google will become less intense and be on par with competitors after the first two years of launch.

[2] Gal, P., Nicoletti, G., Renault, T., Sorbe, S., & C. Timiliotis (2019), Digitalisation and productivity: In search of the holy grail Firm-level empirical evidence from European countries, OECD Working Paper No. 1533.