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The economic opportunity of AI in CCA | Country deep dives

Capturing the next wave of benefits from *generative* AI

An Implement Consulting Group study commissioned by Google
March 2025

Caucasus and Central Asia are regions under economic development which can be accelerated with AI

Making AI benefit society requires an adaptive, human-centric and trustworthy approach.

AI and the next wave of generative AI have the potential to be the most powerful technology in decades. Responsible AI can help solve global challenges such as climate change and access to quality medical care.

AI can make countries more prosperous, productive, innovative, creative and secure. At the same time, there are plenty of pitfalls, paradoxes and tensions that decision-makers will need to navigate.

AI has evolved rapidly with the breakthrough of generative AI in 2022. This report estimates the economic potential of generative AI, while recognising the significant economic potential of other types of AI.

This report considers the entire CCA region, highlighting the countries Armenia, Azerbaijan, Georgia and Kazakhstan

Countries included in the estimation:

Caucasus
Central Asia

Armenia
Population: 2.8 million
GDP: USD 24 billion

Azerbaijan
Population: 10.1 million
GDP: USD 72 billion

Georgia
Population: 3.7 million
GDP: USD 31 billion

Kazakhstan
Population: 19.6 million
GDP: USD 263 billion

Kyrgyz Republic
Population: 6.8 million
GDP: USD 14 billion

Tajikistan
Population: 9.9 million
GDP: USD 12 billion

Turkmenistan
Population: 6.4 million
GDP: USD 61 billion

Uzbekistan
Population: 35.3 million
GDP: USD 102 billion

Note: Gross Domestic Product (GDP) is the total monetary value of all goods and services produced within a country's borders over a specific period. Reported numbers are based on 2023 estimates.
Sources: Tortoise Global AI, World Bank and the International Monetary Fund

In around ten years, generative AI could contribute around 2% to GDP in Caucasus and Kazakhstan

Summary of impacts from generative AI

	The boost to GDP from generative AI around ten years from now.			Share of jobs impacted by generative AI		
	USD billion	Local currency (billion)	% of GDP	No automation	Complemented	Partially or fully displaced
Armenia	**0.4-0.5**	AMD 160-200	2%	50%	46%	4%
Azerbaijan	**1.1-1.3**	AZN 1.9-2.2	2%	59%	38%	3%
Georgia	**0.5-0.6**	GEL 1.4-1.6	2%	47%	49%	4%
Kazakhstan	**4.5-5.5**	KZT 2,000-2,500	2%	41%	54%	5%

- In around ten years, generative AI has the potential to contribute USD 0.5 billion to GDP in Armenia, USD 1.3 billion in Azerbaijan, USD 0.6 billion in Georgia and USD 5.5 billion in Kazakhstan.
- The increase is mainly driven by the productivity boost to a large share of jobs, ranging from 38% of jobs in Azerbaijan to 54% in Kazakhstan.
- Part of the value creation comes from the small share of jobs (3-5%) where generative AI has the potential to free up a significant amount of time for other tasks.
- Despite varying shares of job complementation and reallocation, the total GDP contribution in around ten years is estimated at ~2% for all countries.
- The similar productivity boost despite differing rates of exposure stems from variations in absolute productivity.

Note: Based on 2023 employment data. In accordance with Briggs and Kodnani (2023), "No automation" refers to occupations with less than 10% exposure, "AI as a complement" is occupations with 10-49% exposure and "partial or full displacement" covers occupations with exposure of or above 50%. Note that percentages and absolute numbers are rounded.
Source: Source: Implement Economics based on the Statistical Committee of the Republic of Armenia, the State Statistical Committee of the Republic of Azerbaijan, National Statistics Office of Georgia, Agency for Strategic Planning and Reforms of the Republic of Kazakhstan Bureau of National Statistics, O*Net and Briggs and Kodnani (2023a).

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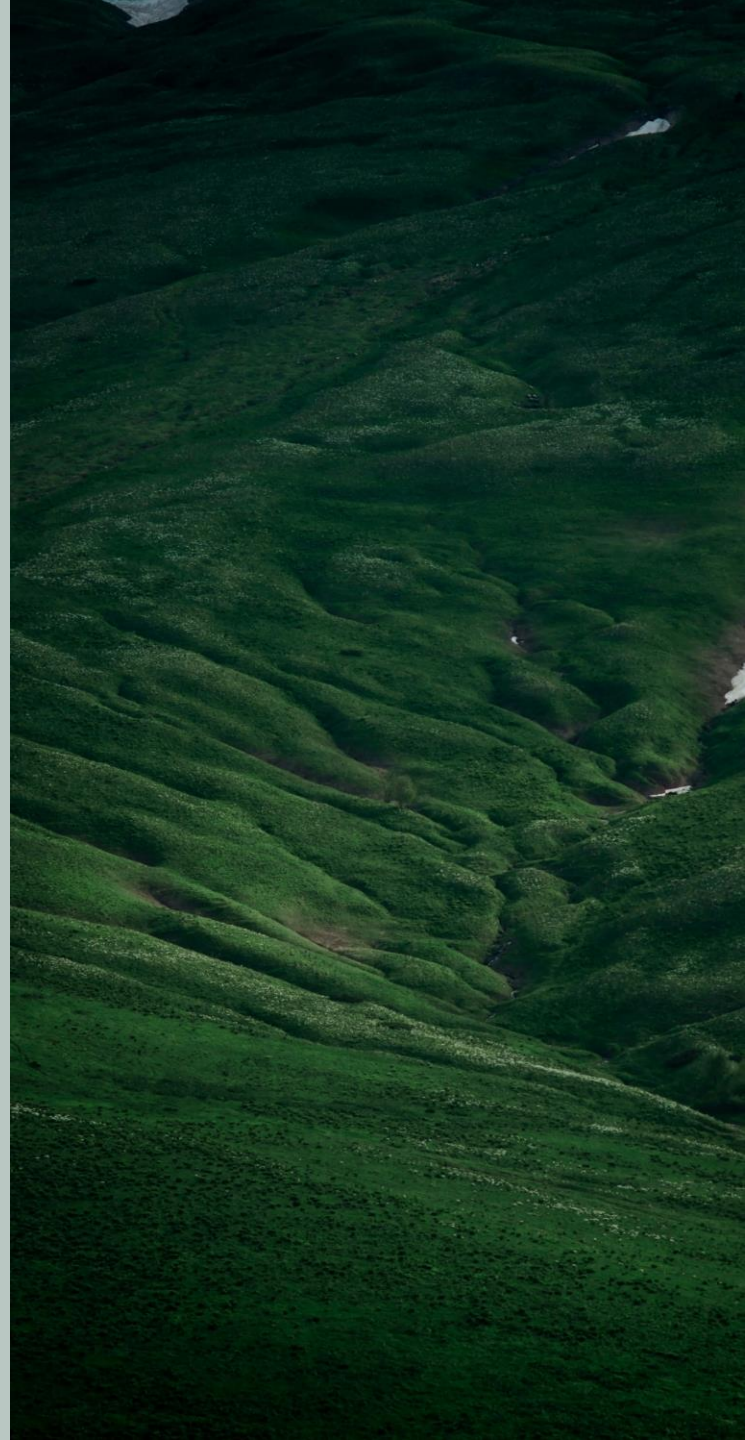
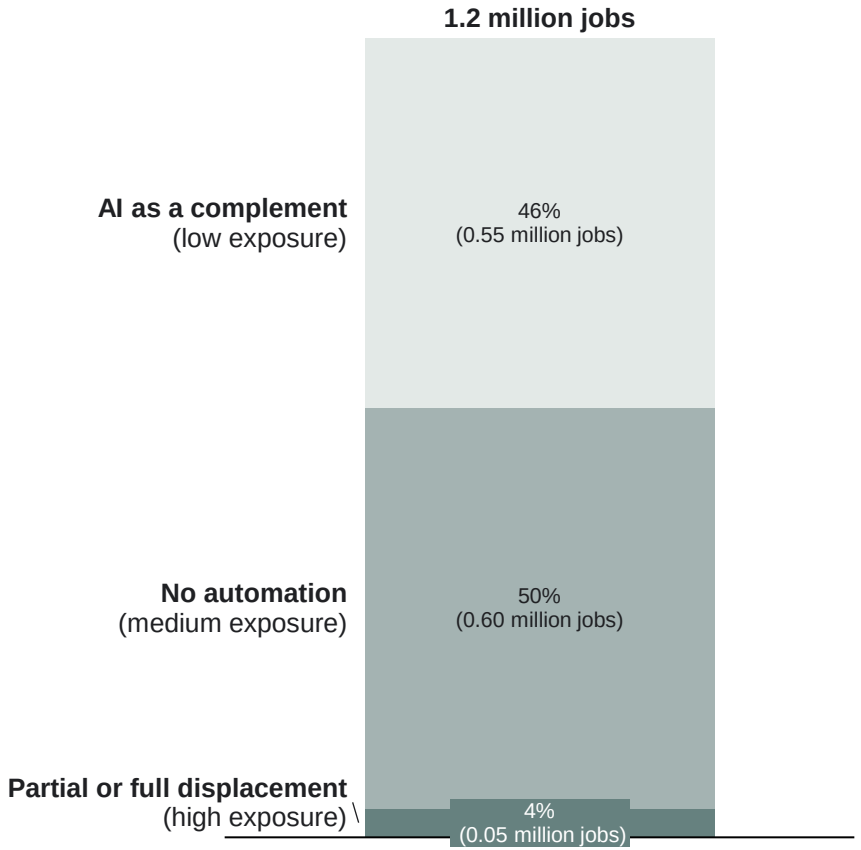
The economic opportunity of AI in Armenia



Generative AI has the potential to augment around half of current jobs in Armenia

Share of jobs in Armenia exposed to automation by generative AI

% of total employment



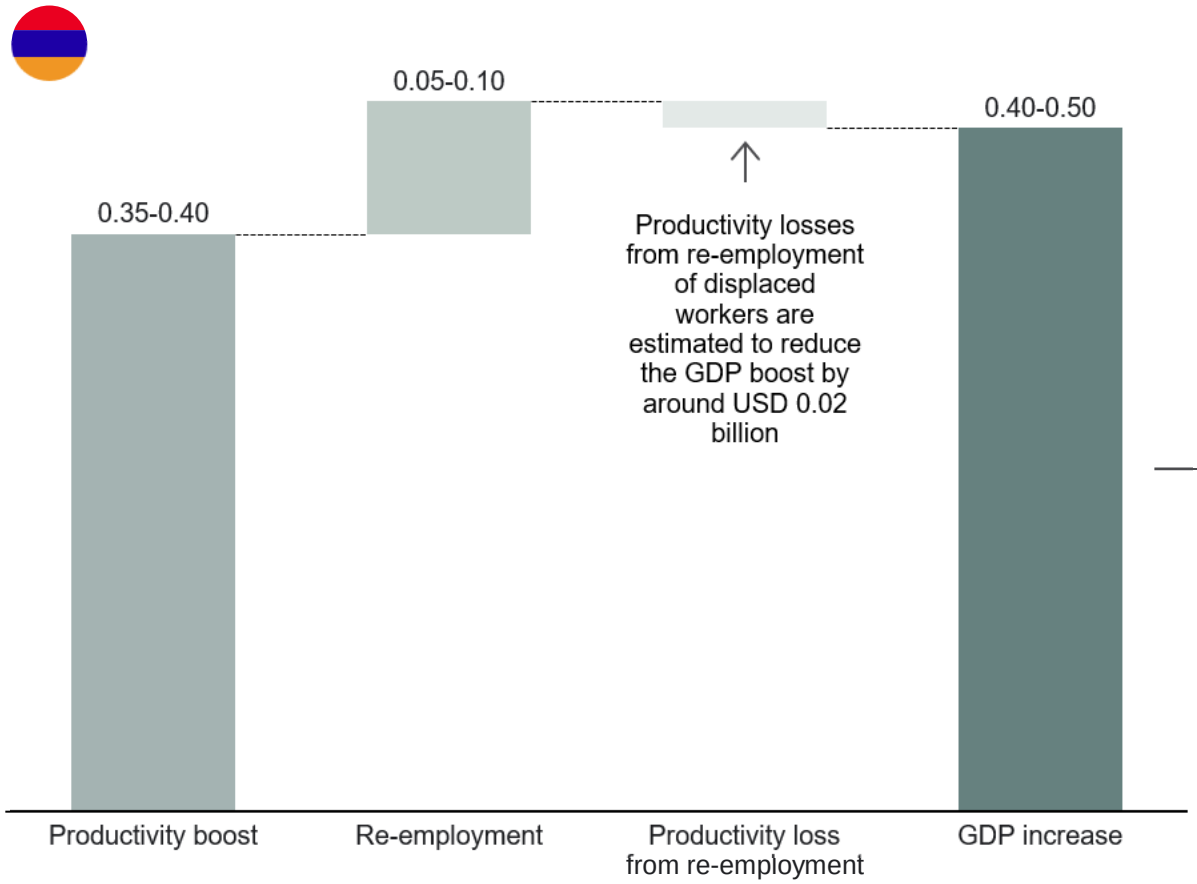
- 46% of jobs in Armenia have the potential to be complemented by generative AI by automating a limited share of their tasks and helping to create more value when working together with generative AI tools.
- Unlike previous waves of automation that mainly impacted manual workers, generative AI is expected to primarily affect office-based professionals.
- An estimated 50% of jobs in Armenia are likely to remain largely unaffected by generative AI. These jobs include manual labour, outdoor tasks such as construction and cleaning, and human-to-human tasks such as personal care and food services. We conservatively assume that all agricultural workers are unaffected by AI. Since agriculture is the largest sector in Armenia, this implies that most jobs will be unaffected.
- A small share of current jobs in Armenia (4%) could potentially have over half of their work activities automated by generative AI, e.g. in occupations such as clerical support workers, contact centre salespersons and translators.

Note: Based on 2023 employment data. In accordance with Briggs and Kodnani (2023a), "Low exposure" refers to occupations with less than 10% exposure, "Medium exposure" is occupations with 10-49% exposure and "High exposure" covers occupations with exposure of or above 50%. Note that percentages and absolute numbers are rounded.
Source: Implement Economics based on the Statistical Committee of the Republic of Armenia, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), World Bank and Dell'Acqua et al. (2023).

Generative AI could increase Armenia's GDP by up to USD 0.5 billion annually in ten years

GDP potential of generative AI in Armenia

USD billion annual increase from baseline GDP after a ten-year adoption period



+2% GDP

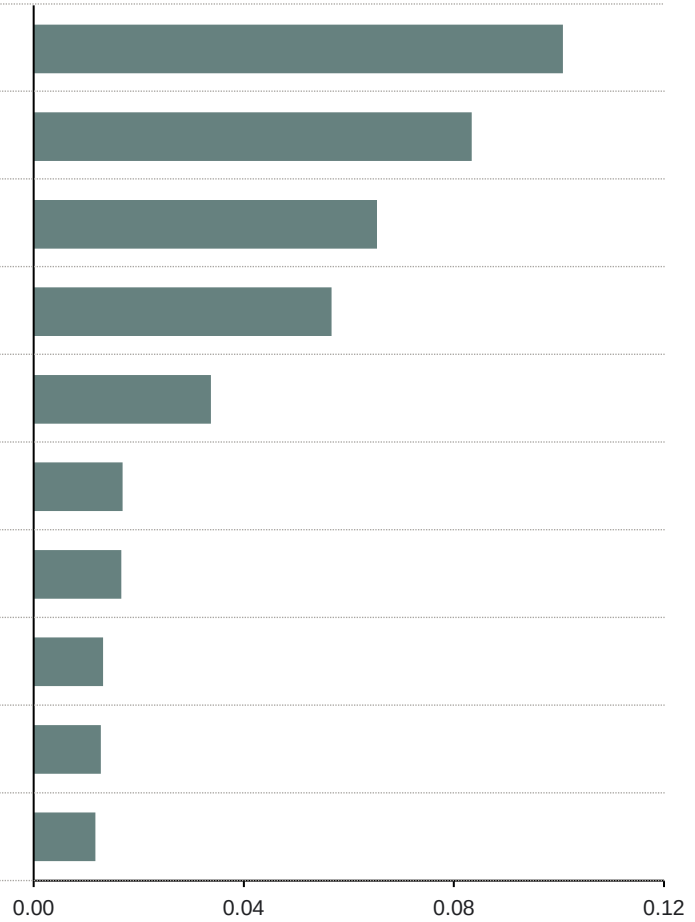
annual contribution in around ten years from now

- We estimate a potential GDP contribution from generative AI of USD 0.4-0.5 billion in around ten years, corresponding to 2% of Armenia's GDP.
- The main impact of generative AI comes from a productivity boost to a large share of workers (46%) by augmenting their capabilities, quality and efficiency, which is estimated at USD 0.35-0.40 billion for Armenia.
- The estimate includes impacts of re-employment of a small share of workers, where generative AI can free up a significant share of work for other tasks. This contribution to GDP is estimated at USD 0.05-0.1 billion in Armenia.
- The estimate accounts for the possible productivity loss associated with re-employment in other occupations. This reduces the estimate for Armenia by USD 0.02 billion.

Note: There is much uncertainty around the capability and adoption timeline of generative AI. The size of the productivity boost depends on the difficulty level of tasks that generative AI will be able to complete and the number of jobs it can automate. GDP is in 2022 levels. Our estimate is the isolated potential of generative AI around ten years from now, when the impact is assumed to peak in leading countries. The estimated boost from generative AI may not be fully additive to GDP trends, as the GDP forecast already assumes a growth contribution from new technologies, and generative AI may substitute some of that. Also, the boost from generative AI may be partially offset by an underlying growth slowdown.
Source: Implement Economics based on the Statistical Committee of the Republic of Armenia, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), and Dell'Acqua et al. (2023).

The largest economic potential of generative AI is found in public administration, finance and business services

	Sector value added	Contribution from generative AI in ten years	
	% of total baseline GDP	% of sector GDP	USD billion
Public administration, education and healthcare	18%	2.5%	
Information and finance	14%	2.7%	
Business services and real estate	11%	2.7%	
Wholesale and retail trade	14%	1.8%	
Manufacturing	12%	1.3%	
Construction	8%	1.0%	
Tourism and other services	4%	1.8%	
Transportation and storage	4%	1.4%	
Utilities, raw materials and waste	3%	1.8%	
Mining and agriculture	13%	0.4%	

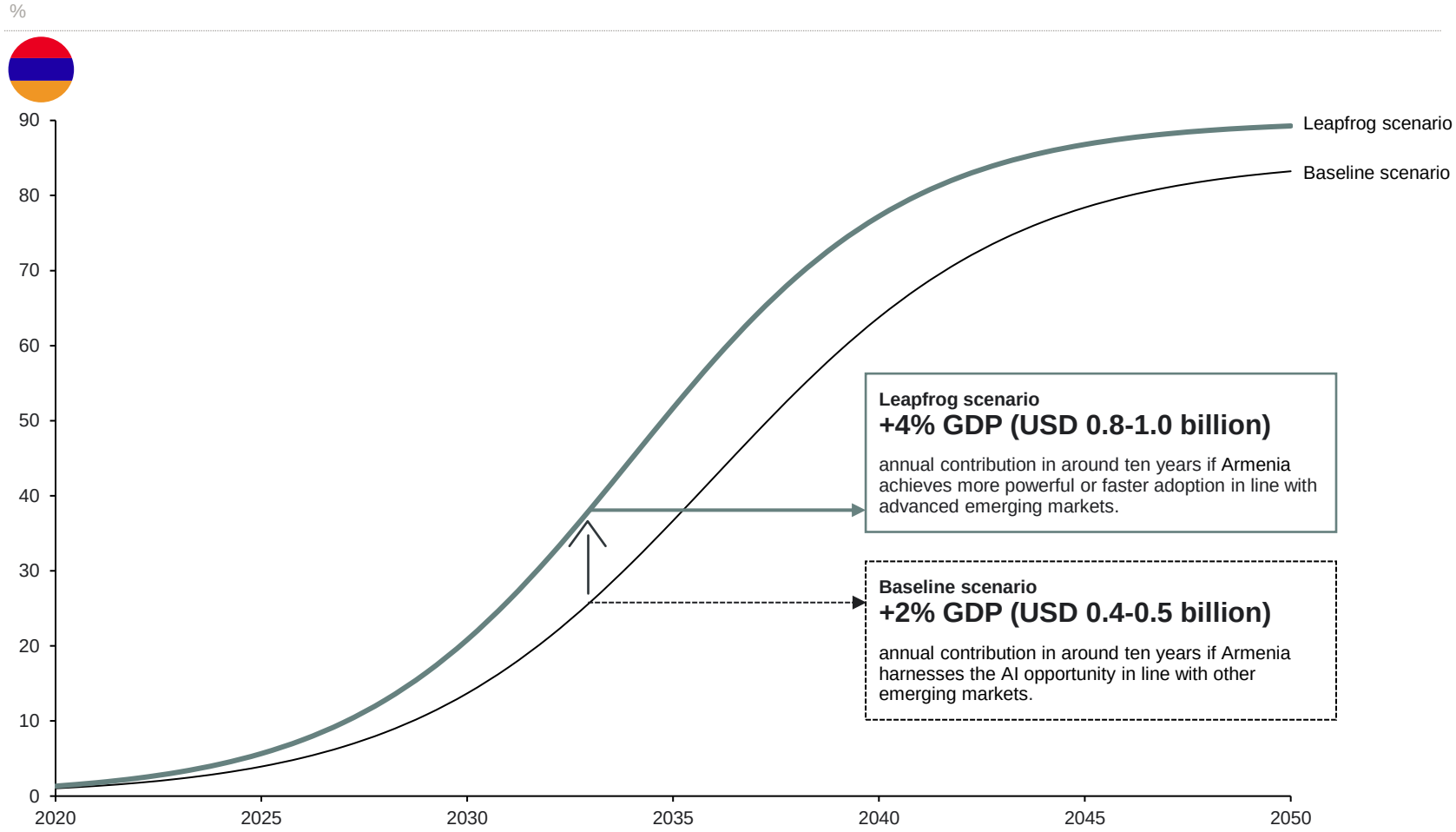


- Generative AI as a tool is most effective in automating knowledge-intensive tasks, such as those carried out in information, finance and business services.
- The largest productivity potentials are found in the public sector, business services and information and finance, where generative AI is estimated to boost sector value added by 2.5-2.7%.
- The largest absolute impact is also seen in the public sector, the largest sector in the Armenian economy. Here, generative AI is estimated to increase value added by around USD 0.1 billion in ten years.
- In contrast to past automation, such as robots, generative AI has the ability to boost productivity in the service sector.

Note: Sectors are aggregated according to NACE categorisation. "Information and Finance" is a combination of information, communication, financial and insurance activities. Labour productivity gains are mapped one to one to GDP if total employment (as here) is assumed constant and the capital stock increases to match productivity improvements. The estimates take into account that the growth impact of generative AI may not be fully additive to the current GDP trend. AI-related gains may substitute for growth that would otherwise occur in a non-AI baseline. The contributions from generative AI shown are based on sectoral gross value added and are scaled to reflect the total GDP increase from generative AI. In line with Briggs and Kodnani (2023a), it is conservatively assumed that the agricultural sector is not impacted by AI in Armenia.
Source: Implement Economics based on the Statistical Committee of the Republic of Armenia, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), and Dell'Acqua et al. (2023).

In a leapfrog scenario the GDP contribution from generative AI could increase from 2% to 4% in Armenia

Adoption of generative AI



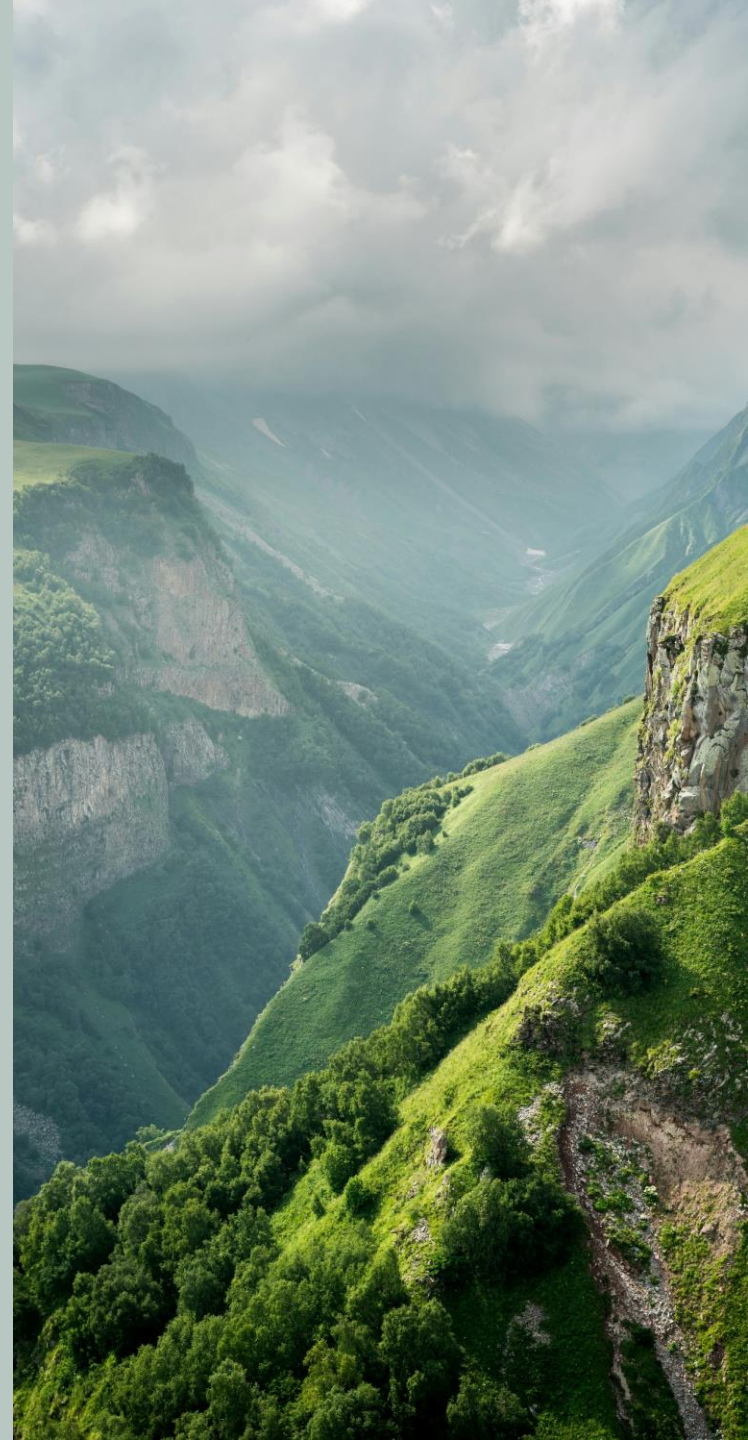
- Compared to other historical technological innovations, generative AI is more powerful, more user-friendly and easier to adopt.
- This presents a significant opportunity for less digitalised countries to leapfrog their digital development by skipping one generation of technology and going straight to the new generation of generative AI tools.
- To gauge the potential, we consider a *leapfrog scenario* where Armenia succeeds in adopting generative AI with the same impact as most advanced emerging markets.
- If Armenia can capture the benefits of generative AI in line with advanced emerging markets, the economic potential in ten years is estimated to increase from 2% (USD 0.4-0.5 billion) to 4% (USD 0.8-1.0 billion).
- The leapfrogging scenario may also mean that generative AI could not only be adopted faster but also provide more powerful boosts to productivity in industries that are lagging behind their more digitalised peers. The boost could potentially be bigger than quantified here.
- Leapfrogging would require a focused effort to significantly elevate key AI drivers in a short timeframe.

Note: GDP figures are expressed in 2023 levels. The figure shows generative AI adoption expressed as a share of economywide companies exposed to AI automation. The estimate is made for a ten-year adoption period to align with the time horizon for widespread adoption by the most advanced emerging markets. Thus, the "leapfrog" scenario assumes adoption in line with "advanced emerging markets", while the "baseline" scenario assumes adoption in line with "other emerging markets" in Briggs and Kodnani (2023b).
Source: Implement Economics based on the Statistical Committee of the Republic of Armenia, O*Net and Briggs and Kodnani (2023a&b).

2

The economic opportunity of AI in Azerbaijan

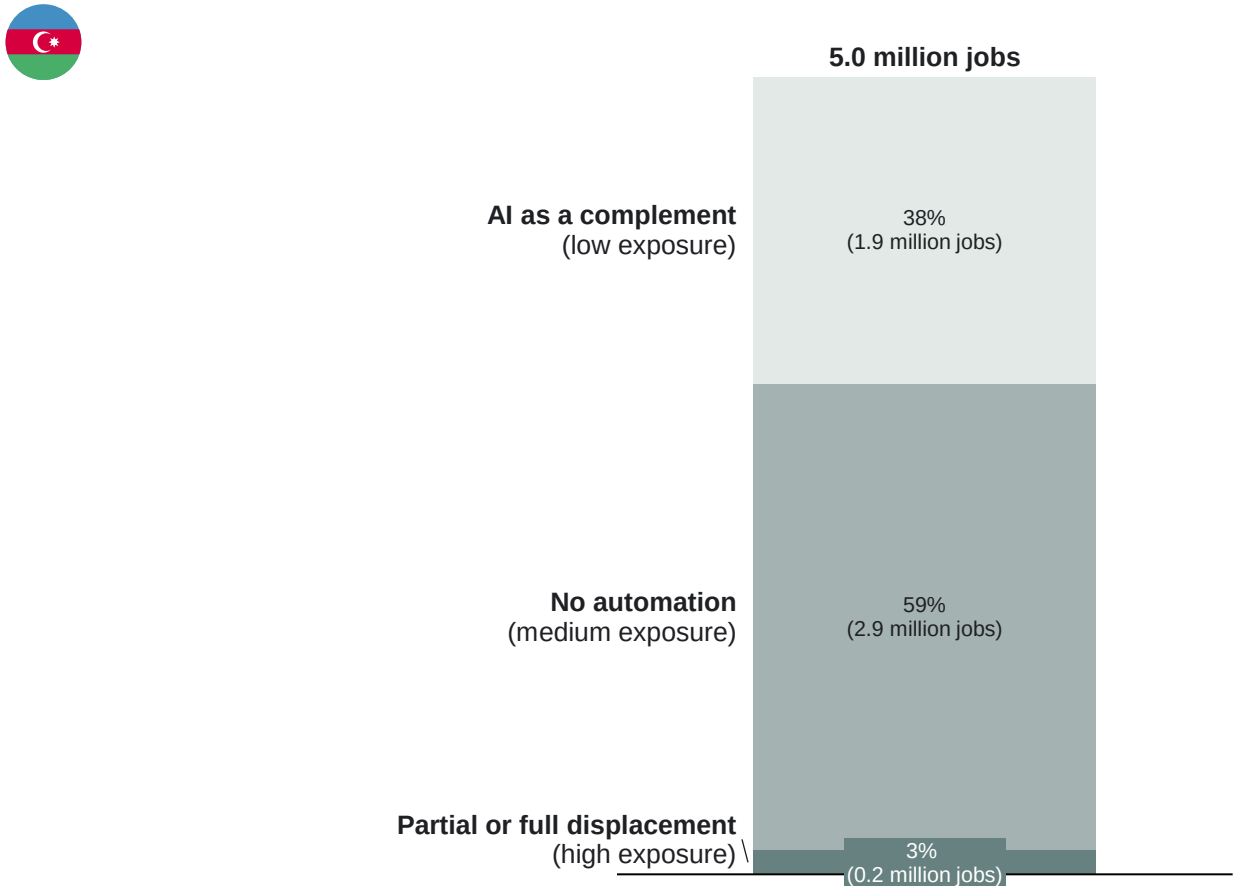
The main economic opportunity in Azerbaijan arises from humans working together with generative AI.



Generative AI has the potential to augment 38% of jobs in Azerbaijan

Share of jobs in Azerbaijan exposed to automation by generative AI

% of total employment



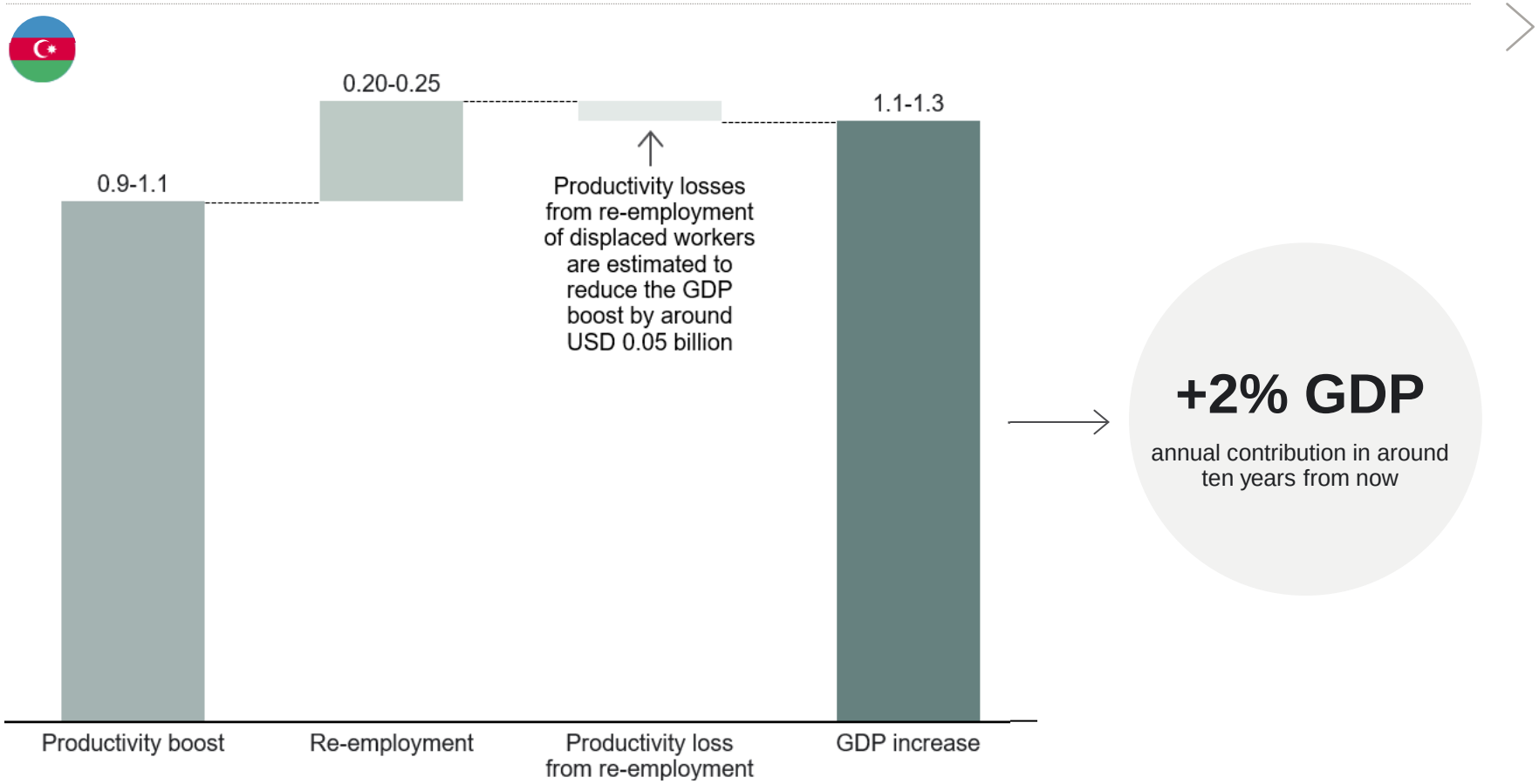
- 38% of jobs in Azerbaijan have the potential to be augmented and complemented by generative AI by automating a limited share of their tasks and helping to create more value when working together with the machine using generative AI technology.
- Unlike previous waves of automation that mainly impacted manual workers, generative AI is expected to primarily affect office-based professionals. We conservatively assume that no agricultural jobs in Azerbaijan are augmented by AI.
- An estimated 59% of jobs in are likely to remain largely unaffected by generative AI. These jobs include manual labour, outdoor tasks such as construction and cleaning, and human-to-human tasks such as personal care and food services.
- A small share of current jobs in Azerbaijan (3%) could potentially have over half of their work activities automated by generative AI, e.g. in occupations such as clerical support workers, contact centre salespersons and translators. These workers are likely to see their jobs fundamentally change and may need to be re-employed in new occupations.

Note: Based on 2023 employment data. In accordance with Briggs and Kodnani (2023a), "Low exposure" refers to occupations with less than 10% exposure, "Medium exposure" is occupations with 10-49% exposure and "High exposure" covers occupations with exposure of or above 50%. Note that percentages and absolute numbers are rounded.
Source: Implement Economics based on the State Statistical Committee of the Republic of Azerbaijan, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), CEIC, and Dell'Acqua et al. (2023).

Generative AI could increase GDP in Azerbaijan by USD 1.1-1.3 billion annually in ten years

GDP potential of generative AI in Azerbaijan

USD billion annual increase from baseline GPD after a ten-year adoption period



+2% GDP

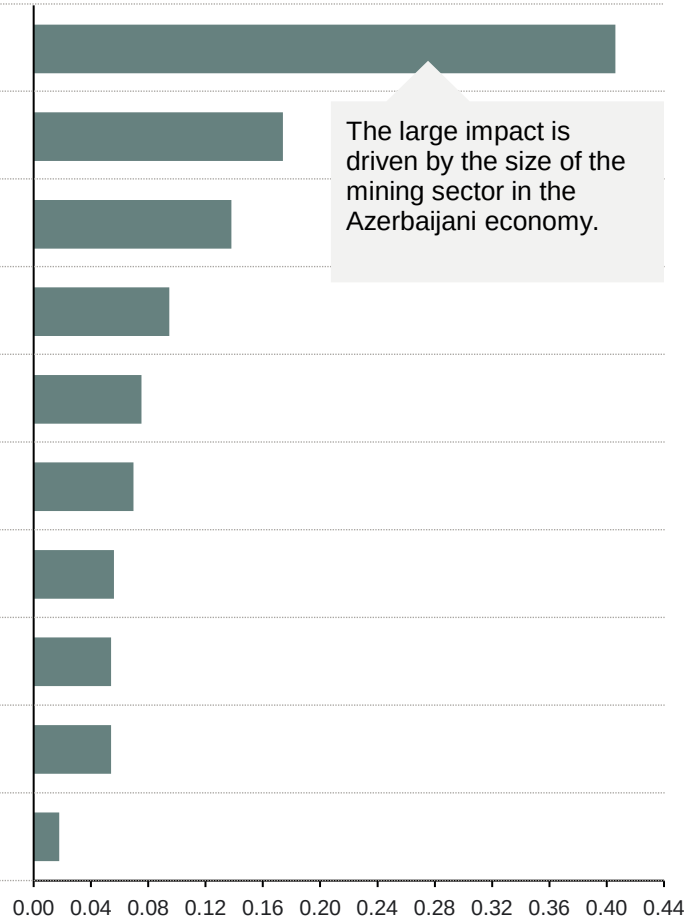
annual contribution in around ten years from now

- We estimate a potential GDP contribution of USD 1.1-1.3 billion in around ten years, corresponding to 2% of Azerbaijan's GDP.
- The main impact of generative AI comes from a productivity boost to workers by augmenting their capabilities, quality and efficiency, which is estimated at USD 0.9-1.1 billion for Azerbaijan.
- The estimate includes impacts of re-employment of a small share of workers, where generative AI frees up a significant share of work for other tasks. This contribution to GDP is estimated at USD 0.20-0.25 billion in Azerbaijan.
- The estimate accounts for the possible productivity loss associated with re-employment in other occupations. This reduces the estimate for Azerbaijan by around USD 0.05 billion.

Note: There is much uncertainty around the capability and adoption timeline of generative AI. The size of the productivity boost depends on the difficulty level of tasks that generative AI will be able to complete and the number of jobs it can automate. GDP is in 2023 levels. Our estimate is the isolated potential of generative AI around ten years from now, when the impact is assumed to peak in leading countries. The estimated boost from generative AI may not be fully additive to GDP trends, as the GDP forecast already assumes a growth contribution from new technologies, and generative AI may substitute some of that. Also, the boost from generative AI may be partially offset by an underlying growth slowdown. Due to data limitations, the estimate assumes a similar sectoral distribution of occupations as in similar neighbouring countries.
Source: Implement Economics based on the State Statistical Committee of the Republic of Azerbaijan, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), CEIC, and Dell'Acqua et al. (2023).

The largest economic potential from generative AI stems from public administration and mining and agriculture

	Sector value added	Contribution from generative AI in ten years	
	% of total baseline GDP	% of sector GDP	USD billion
Mining and agriculture	43%	1.3%	
Public administration, education and health care	10%	2.5%	
Wholesale and retail trade	11%	1.9%	
Business services and real estate	5%	2.7%	
Information and finance	4%	2.8%	
Transportation and storage	7%	1.5%	
Manufacturing	6%	1.3%	
Construction	7%	1.1%	
Tourism and other services	4%	1.9%	
Utilities, raw materials and waste	1%	1.9%	

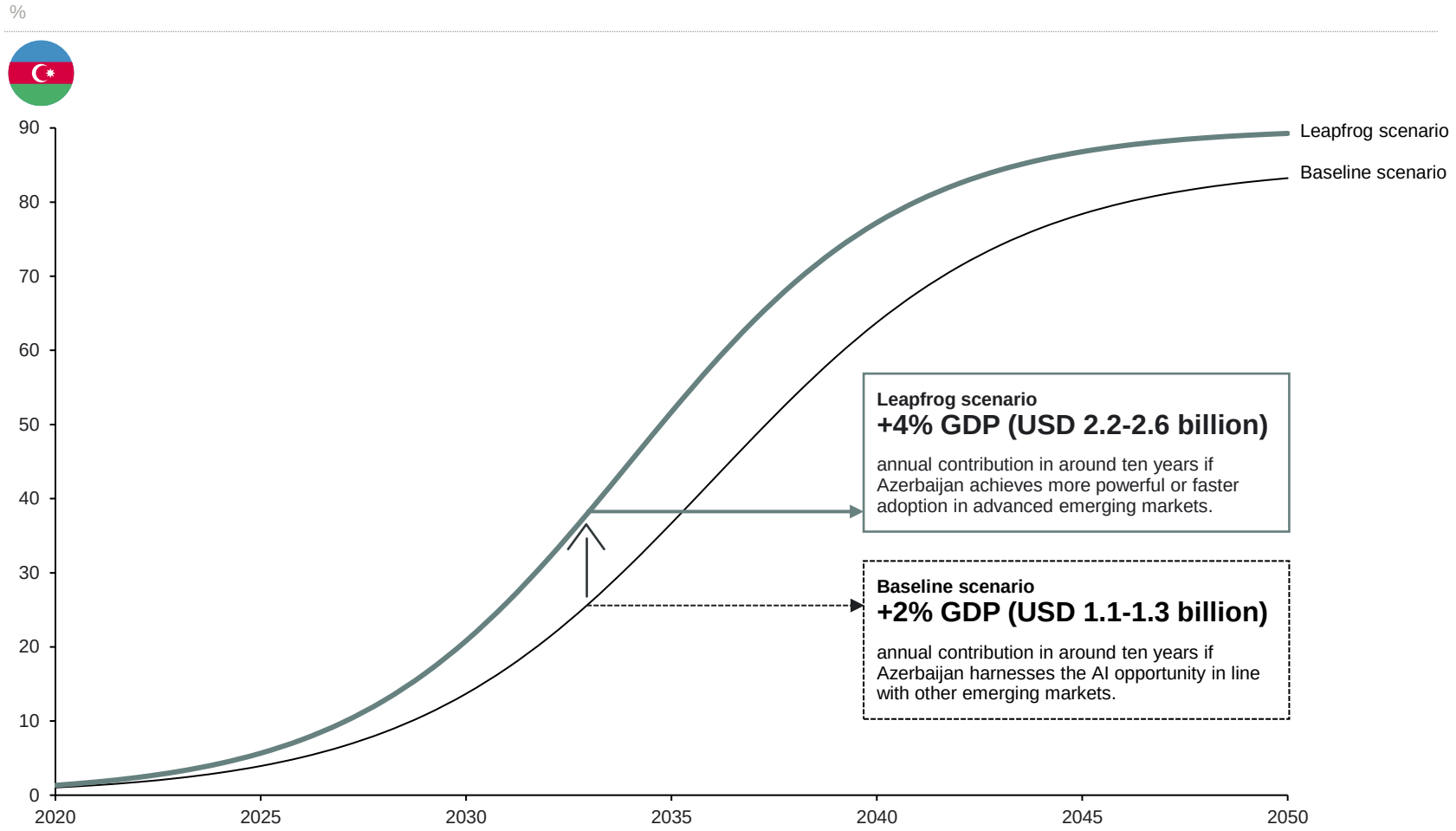


- Generative AI has considerable potential in the very large mining sector in Azerbaijan, although the percentage increase in productivity is lower than in other sectors. The large potential is thus primarily due to the sector's size in the economy today. The potential in the mining sector is driven by the jobs of technicians, professionals and managers, which are mostly complemented by generative AI.
- Generative AI as a tool is most effective in automating knowledge-intensive tasks, such as those carried out in information, finance and business services.
- The largest productivity potentials are found in public administration, business services and information and finance, where generative AI is estimated to boost sector value added by 2.5-2.8%.
- In contrast to past automation, such as robots, generative AI has the ability to boost productivity in the service sector.

Note: Sectors are aggregated according to NACE categorisation. "Information and Finance" is a combination of information, communication, financial and insurance activities. Labour productivity gains are mapped one to one to GDP if total employment (as here) is assumed constant and the capital stock increases to match productivity improvements. The estimates take into account that the growth impact of generative AI may not be fully additive to the current GDP trend. AI-related gains may substitute for growth that would otherwise occur in a non-AI baseline. The contributions from generative AI shown are based on sectoral gross value added and are scaled to reflect the total GDP increase from generative AI. In line with Briggs and Kodnani (2023a), it is conservatively assumed that the agricultural sector is not impacted by AI in Azerbaijan.
Source: Implement Economics based on the State Statistical Committee of the Republic of Azerbaijan, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), CEIC, and Dell'Acqua et al. (2023).

In a leapfrog scenario the GDP contribution from generative AI could increase from 2% to 4% in Azerbaijan

Adoption of generative AI



- Compared to other historical technological innovations, generative AI is more powerful, more user-friendly and easier to adopt.
- This presents a significant opportunity for less digitalised countries to leapfrog their digital development by skipping one generation of technology and going straight to the new generation of generative AI tools.
- To gauge the potential, we consider a *leapfrog scenario* where Azerbaijan succeeds in adopting generative AI with the same impact as more advanced emerging markets.
- If Azerbaijan can capture the benefits of generative AI in line with these advanced emerging markets, the economic potential in ten years is estimated to increase from 2% (USD 1.1-1.3 billion) to 4% (USD 2.2-2.6 billion).
- The leapfrogging scenario may also mean that generative AI could not only be adopted faster but also provide more powerful boosts to productivity in industries that are lagging behind their more digitalised peers. The boost could potentially be bigger than quantified here.
- Leapfrogging would require a focused effort to significantly elevate key AI drivers in a short timeframe.

Note: GDP figures are expressed in 2023 levels. The figure shows generative AI adoption expressed as a share of economywide companies exposed to AI automation. The estimate is made for a ten-year adoption period to align with the time horizon for widespread adoption by the most advanced emerging markets. Thus, the "leapfrog" scenario assumes adoption in line with "advanced emerging markets", while the "leapfrog" scenario assumes adoption in line with "other emerging markets" in Briggs and Kodnani (2023b).
Source: Implement Economics based on the State Statistical Committee of the Republic of Azerbaijan, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), CEIC, and Dell'Acqua et al. (2023).

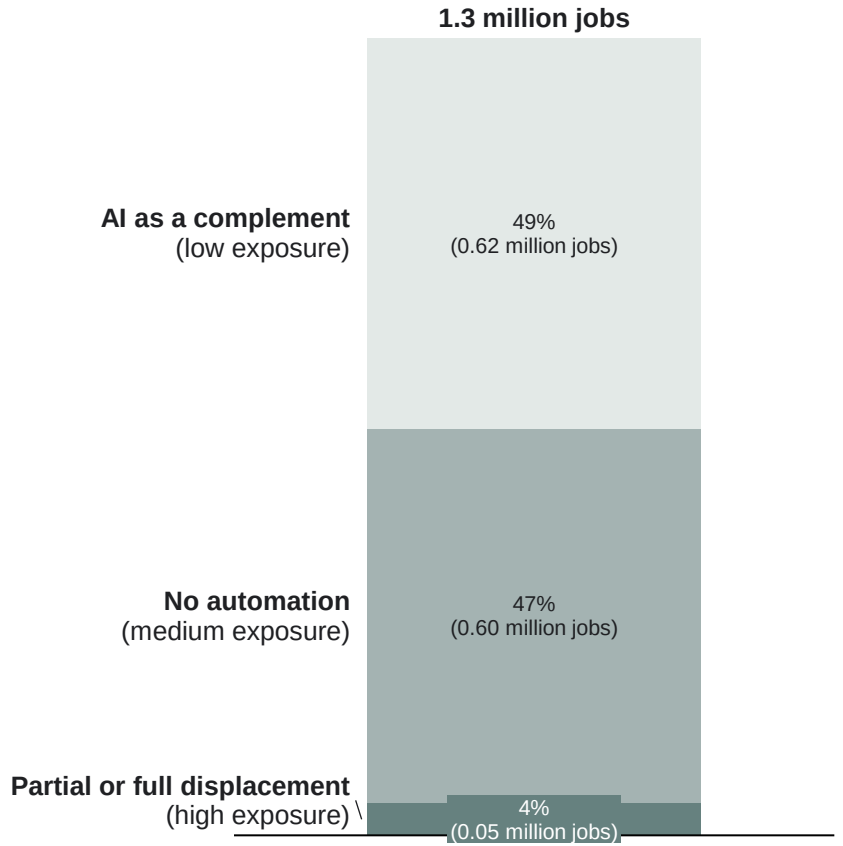
3

The economic opportunity of AI in Georgia

Generative AI has the potential to augment half of current jobs in Georgia

Share of jobs in Georgia exposed to automation by generative AI

% of total employment



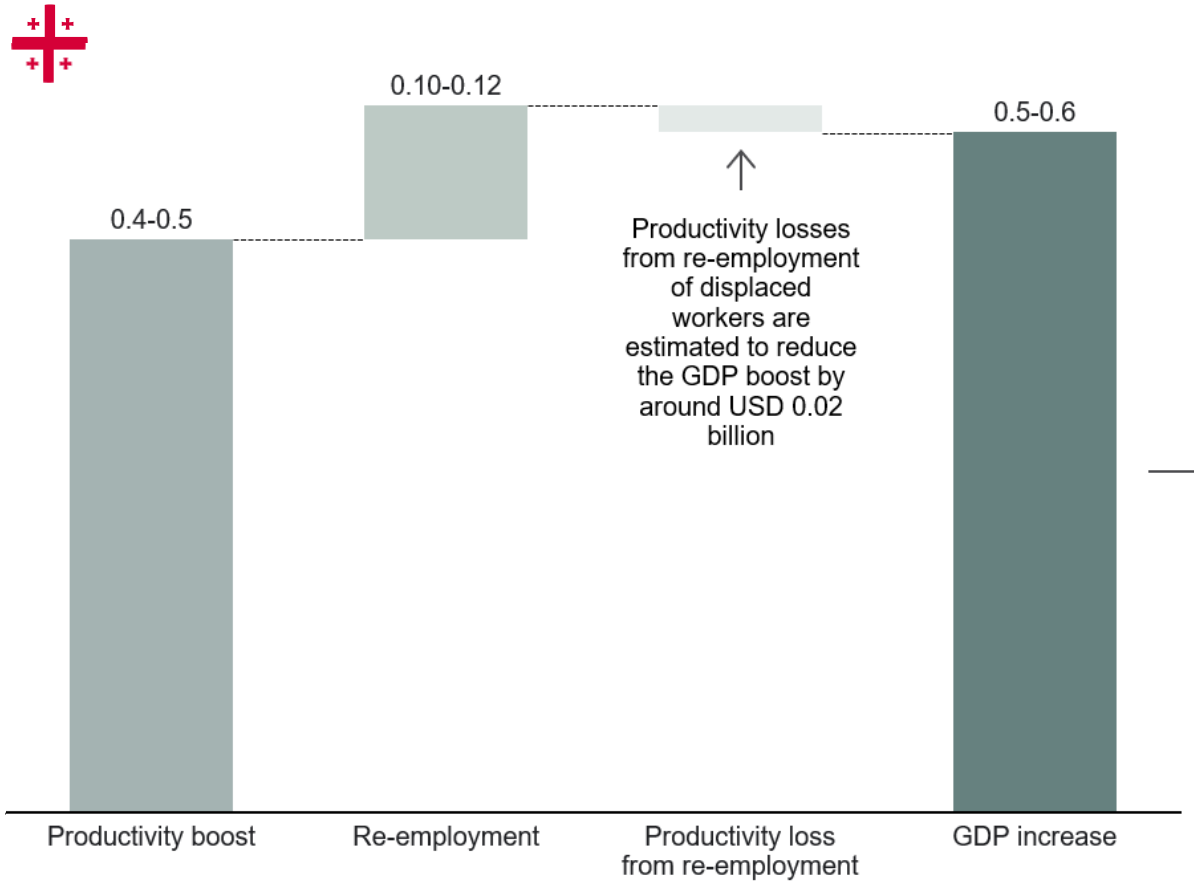
- Almost every other job in Georgia (49%) has the potential to be augmented and complemented by generative AI by automating a limited share of their tasks and helping to create more value when working together with generative AI technology.
- Unlike previous waves of automation that mainly impacted manual workers, generative AI is expected to primarily affect office-based professionals.
- Roughly half of jobs (47%) in Georgia are likely to remain largely unaffected by generative AI. These jobs include manual labour, outdoor tasks such as construction and cleaning, and human-to-human tasks such as personal care and food services. We conservatively assume that agricultural workers are unaffected by the economywide adoption of AI.
- A small share of current jobs in Georgia (4%) could potentially have over half of their work activities automated by generative AI, e.g. in occupations such as clerical support workers, contact centre salespersons and translators. These workers are likely to see their jobs fundamentally change and may need to be re-employed in new occupations.

Note: Based on 2023 employment data. In accordance with Briggs and Kodnani (2023a), "Low exposure" refers to occupations with less than 10% exposure, "Medium exposure" is occupations with 10-49% exposure and "High exposure" covers occupations with exposure of or above 50%. Note that percentages and absolute numbers are rounded.
Source: Implement Economics based on the National Statistics Office of Georgia, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), Bureeau of Labor Statistics and Dell'Acqua et al. (2023).

Generative AI could increase Georgia's GDP by up to USD 0.6 billion annually in ten years

GDP potential of generative AI in Georgia

USD billion annual increase from baseline GDP after a ten-year adoption period



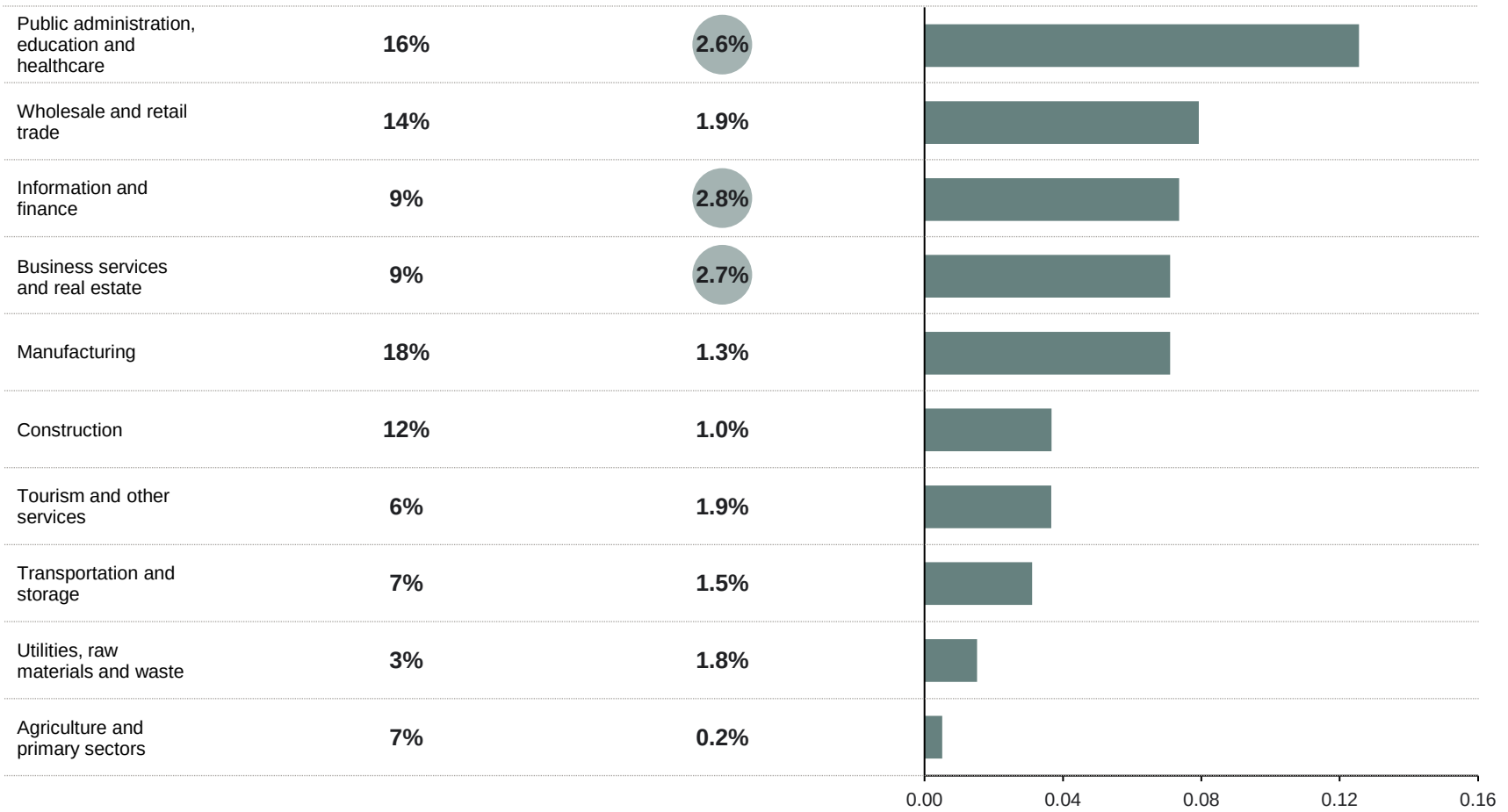
+2% GDP

annual contribution in around ten years from now

- We estimate a potential increase in GDP of USD 0.5-0.6 billion in around ten years, corresponding to 2% of Georgia's GDP.
- The main impact of generative AI comes from a productivity boost to the workers whose capabilities are augmented by AI. This effect accounts for USD 0.4-0.5 billion.
- The estimate includes impacts of re-employment of a small share of workers, where generative AI frees up a significant share of work for other tasks. This contribution to GDP is estimated at USD 0.10-0.12 billion in Georgia.
- The estimate accounts for the possible productivity loss associated with re-employment in other occupations. This reduces the estimate for Georgia by around USD 0.02 billion.

Note: There is much uncertainty around the capability and adoption timeline of generative AI. The size of the productivity boost depends on the difficulty level of tasks that generative AI will be able to complete and the number of jobs it can automate. GDP is in 2023 levels. Our estimate is the isolated potential of generative AI around ten years from now, when the impact is assumed to peak in leading countries. The estimated boost from generative AI may not be fully additive to GDP trends, as the GDP forecast already assumes a growth contribution from new technologies and generative AI may substitute some of that. Also, the boost from generative AI may be partially offset by an underlying growth slowdown.
Source: Implement Economics based on the National Statistics Office of Georgia, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), Bureeau of Labor Statistics and Dell'Acqua et al. (2023).

Generative AI has large economic potential in public administration, and wholesale and retail trade

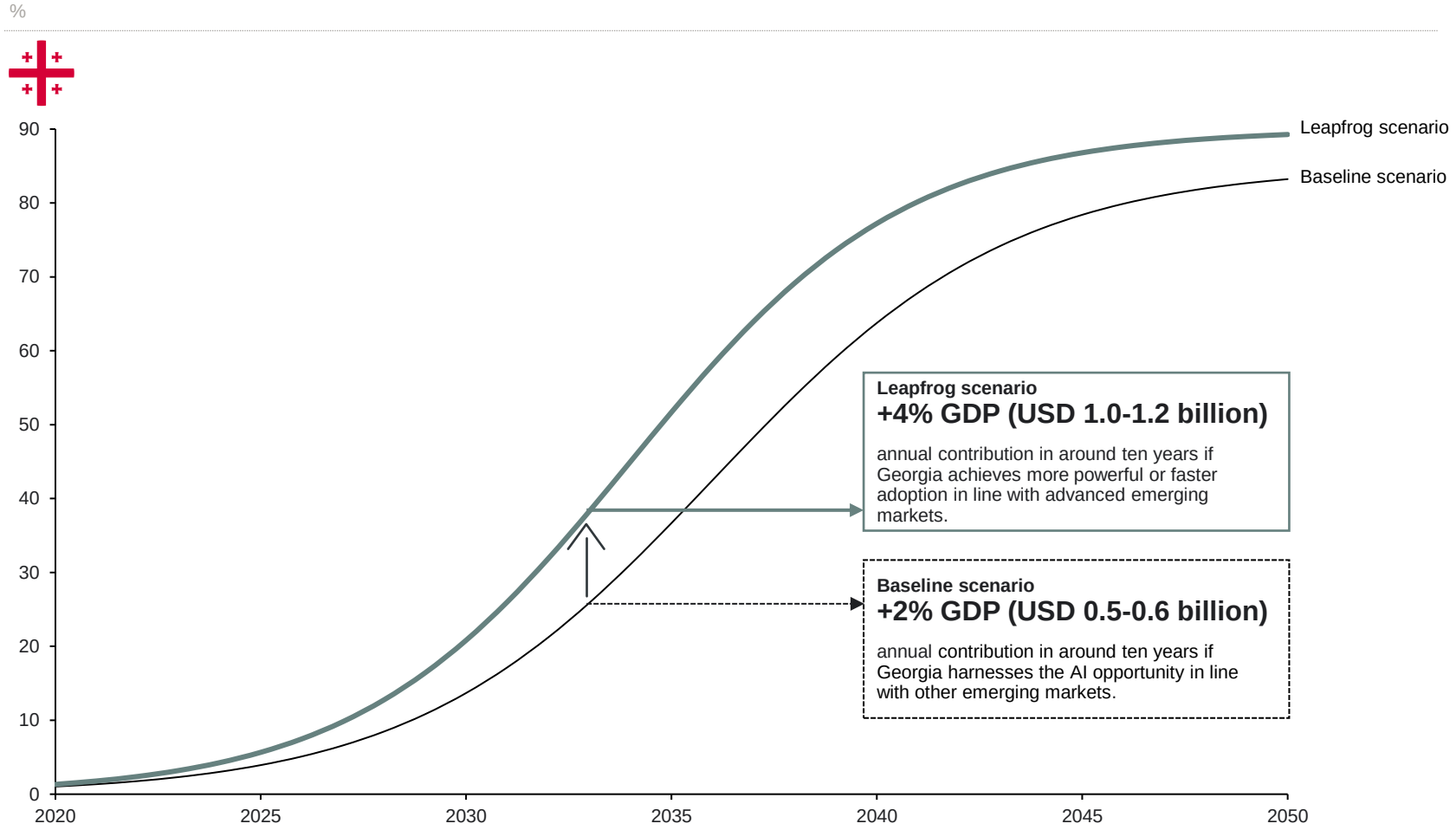


- The largest productivity potentials are found in public administration, wholesale and retail trade, and information and finance, where generative AI is estimated to boost sector value added by 2.6-2.8%.
- The largest absolute impact is also seen in the public sector, the second largest sector in the Georgian economy. Here, generative AI is estimated to increase value added by around USD 0.12 billion in ten years.
- In contrast to past automation, such as robots, generative AI has the ability to boost productivity in the service sector.

Note: Sectors are aggregated according to NACE categorisation. "Information and Finance" is a combination of information, communication, financial and insurance activities. Labour productivity gains are mapped one to one to GDP if total employment (as here) is assumed constant and the capital stock increases to match productivity improvements. The estimates take into account that the growth impact of generative AI may not be fully additive to the current GDP trend. AI-related gains may substitute for growth that would otherwise occur in a non-AI baseline. The contributions from generative AI shown are based on sectoral gross value added and are scaled to reflect the total GDP increase from generative AI. In line with Briggs and Kodnani (2023a), it is conservatively assumed that the agricultural sector is not impacted by AI in Georgia.
Source: Implement Economics based on the National Statistics Office of Georgia, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), Bureeau of Labor Statistics and Dell'Acqua et al. (2023).

In a leapfrog scenario the annual GDP contribution from generative AI could increase from 2% to 4%

Adoption of generative AI



- Compared to other historical technological innovations, generative AI is more powerful, more user-friendly and easier to adopt.
- This presents a significant opportunity for less digitalised countries to leapfrog their digital development by skipping one generation of technology and going straight to the new generation of generative AI tools.
- To gauge the potential, we consider a *leapfrog scenario* where Georgia succeeds in adopting generative AI with the same impact as advanced emerging markets.
- If Georgia can capture the benefits of generative AI in line with advanced emerging markets, the economic potential in ten years is estimated to increase from 2% (USD 0.5-0.6 billion) to 4% (USD 1.0-1.2 billion).
- The leapfrogging scenario may also mean that generative AI could not only be adopted faster but also provide more powerful boosts to productivity in industries that are lagging behind their more digitalised peers. The boost could potentially be bigger than quantified here.
- Leapfrogging would require a focused effort to significantly elevate key AI drivers in a short timeframe.

Note: GDP figures are expressed in 2023 levels. The figure shows generative AI adoption expressed as a share of economywide companies exposed to AI automation. The estimate is made for a ten-year adoption period to align with the time horizon for widespread adoption by the most advanced emerging markets. Thus, the "leapfrog" scenario assumes adoption in line with "advanced emerging markets", while the "baseline" scenario assumes adoption in line with "other emerging markets" in Briggs and Kodnani (2023b).
Source: Implement Economics based on the National Statistics Office of Georgia, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), Bureeau of Labor Statistics and Dell'Acqua et al. (2023).

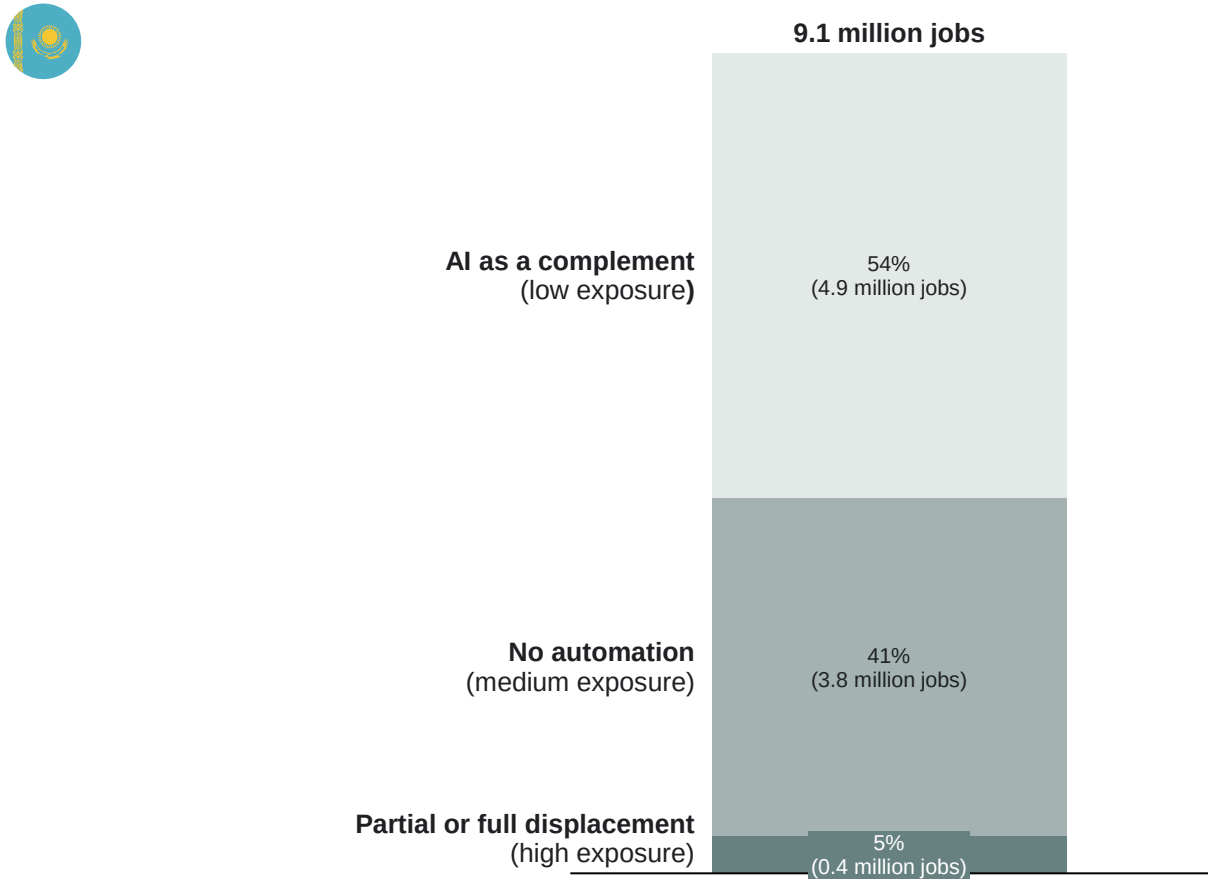
4

The economic opportunity of AI in Kazakhstan

Generative AI has the potential to augment 54% of jobs in Kazakhstan

Share of jobs exposed to automation by generative AI

% of total employment



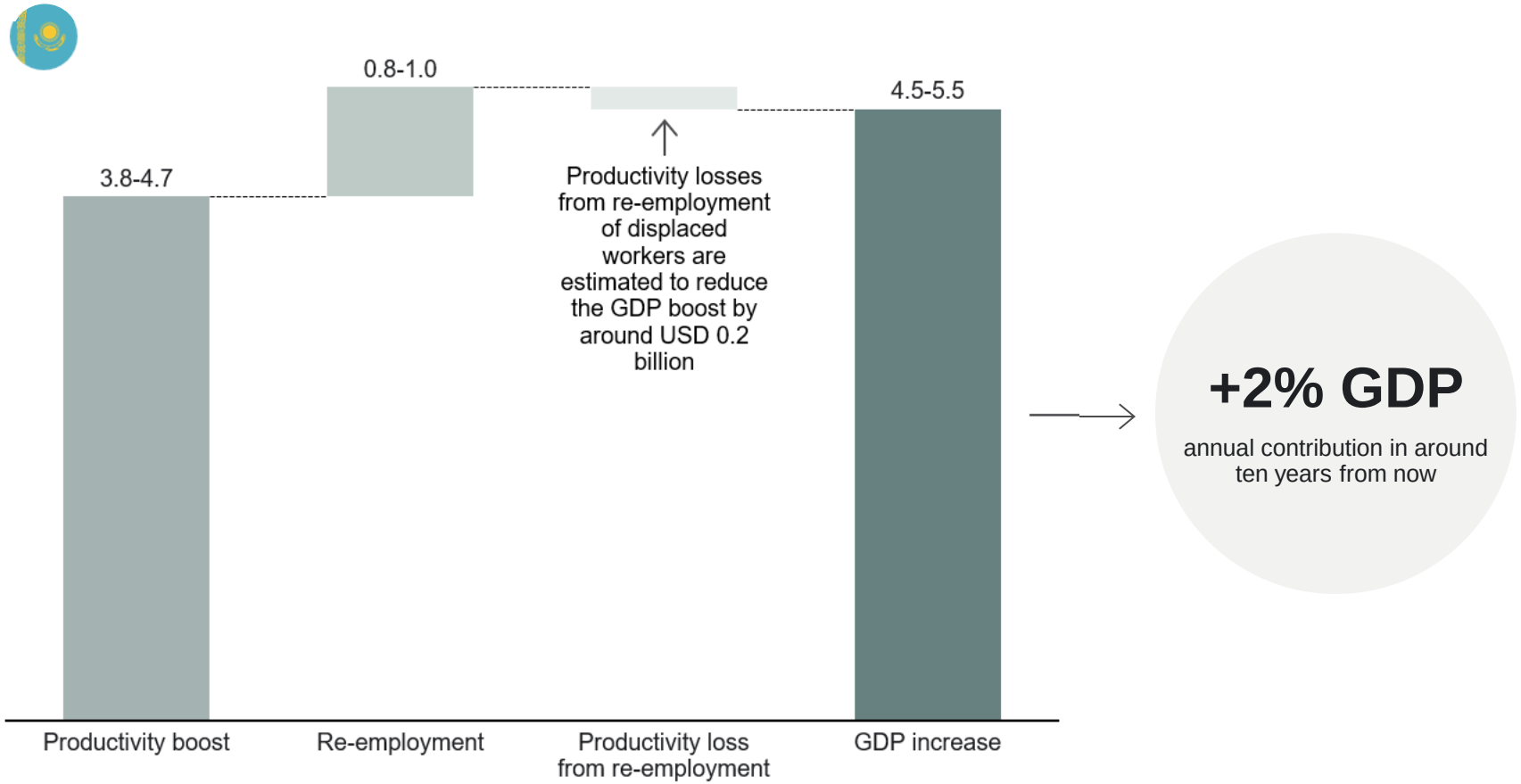
- Most jobs in Kazakhstan (54%) have the potential to be complemented by generative AI by automating a limited share of their tasks and helping to create more value when working together with the machine using generative AI technology.
- Unlike previous waves of automation that mainly impacted manual workers, generative AI is expected to primarily affect office-based professionals.
- An estimated 41% of jobs in Kazakhstan are likely to remain largely unaffected by generative AI. These jobs include manual labour, outdoor tasks such as construction and cleaning, and human-to-human tasks such as personal care and food services.
- A small share of current jobs in Kazakhstan (5%) could potentially have over half of their work activities automated by generative AI, e.g. in occupations such as clerical support workers, contact centre salespersons and translators. Over time, these workers are likely to see their jobs fundamentally change and may need to be re-employed in new occupations.

Note: Based on 2023 employment data. In accordance with Briggs and Kodnani (2023a), "Low exposure" refers to occupations with less than 10% exposure, "Medium exposure" is occupations with 10-49% exposure and "High exposure" covers occupations with exposure of or above 50%. Note that percentages and absolute numbers are rounded.
Source: Implement Economics based on the Agency for Strategic Planning and Reforms of the Republic of Kazakhstan Bureau of National Statistics, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), National Statistics Bureau, and Dell'Acqua et al. (2023).

Generative AI could increase Kazakhstan's GDP by up to USD 5.5 billion annually in ten years

GDP potential of generative AI in Kazakhstan

USD billion annual increase from baseline GDP after a ten-year adoption period



+2% GDP

annual contribution in around ten years from now

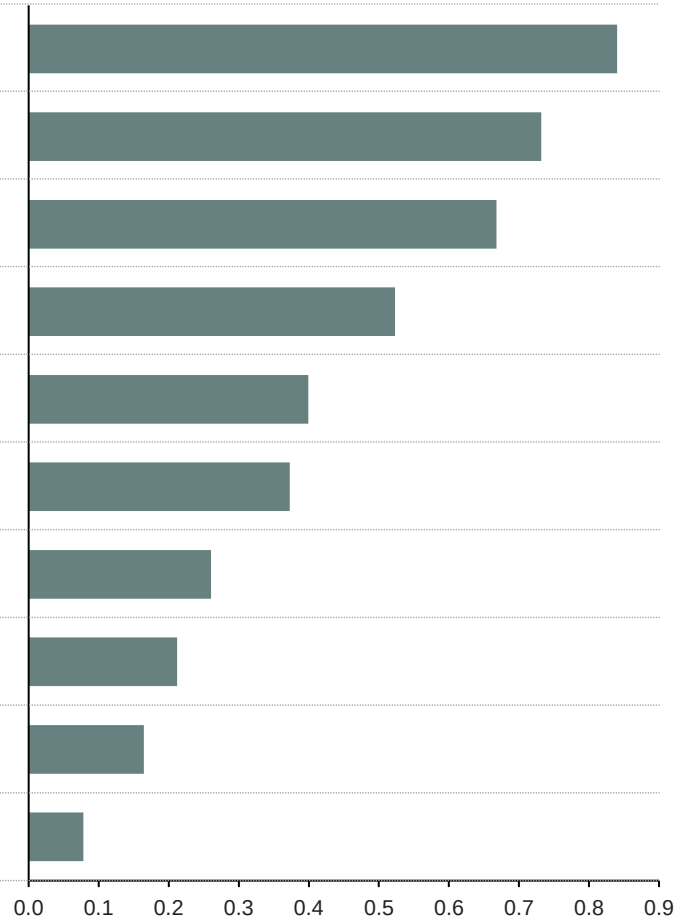
- We estimate a potential GDP contribution from generative AI of USD 4.5-5.5 billion in around ten years from now, corresponding to 2% of Kazakhstan's GDP.
- The main impact of generative AI comes from a productivity boost for workers by augmenting their capabilities, quality and efficiency, which is estimated at USD 3.8-4.7 billion for Kazakhstan. This includes the value created with the small share of working time being re-prioritised for other value-creating tasks.
- There is also a value contribution from the re-employment of a small share of workers, where generative AI frees up a significant share of work for other tasks. This contribution to GDP is estimated at USD 0.8-1.0 billion in Kazakhstan.
- The estimate accounts for the possible productivity loss associated with re-employment in other occupations. This reduces the estimate for Kazakhstan by around USD 0.2 billion.

Note: There is much uncertainty around the capability and adoption timeline of generative AI. The size of the productivity boost depends on the difficulty level of tasks that generative AI will be able to complete and the number of jobs it can automate. GDP is in 2023 levels. Our estimate is the isolated potential of generative AI around ten years from now, when the impact is assumed to peak in leading countries. The estimated boost from generative AI may not be fully additive to GDP trends, as the GDP forecast already assumes a growth contribution from new technologies and generative AI may substitute some of that. Also, the boost from generative AI may be partially offset by an underlying growth slowdown. Due to data limitations, the estimate assumes a similar sectoral distribution of occupations as in similar neighbouring countries.

Source: Implement Economics based on the Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National Statistics, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), National Statistics Bureau, and Dell'Acqua et al. (2023).

Generative AI has large economic potential in business services – but it also affects the large manufacturing and trade sectors in Kazakhstan

	Sector value added	Contribution from generative AI in ten years	
	% of total baseline GDP	% of sector GDP	USD billion
Wholesale and retail trade	20%	1.9%	
Business services and real estate	12%	2.7%	
Public administration, education and health care	11%	2.6%	
Mining and agriculture	18%	1.1%	
Manufacturing	13%	1.3%	
Information and finance	6%	2.8%	
Tourism and other services	6%	1.9%	
Transportation and storage	6%	1.5%	
Construction	6%	1.1%	
Utilities, raw materials and waste	2%	1.9%	

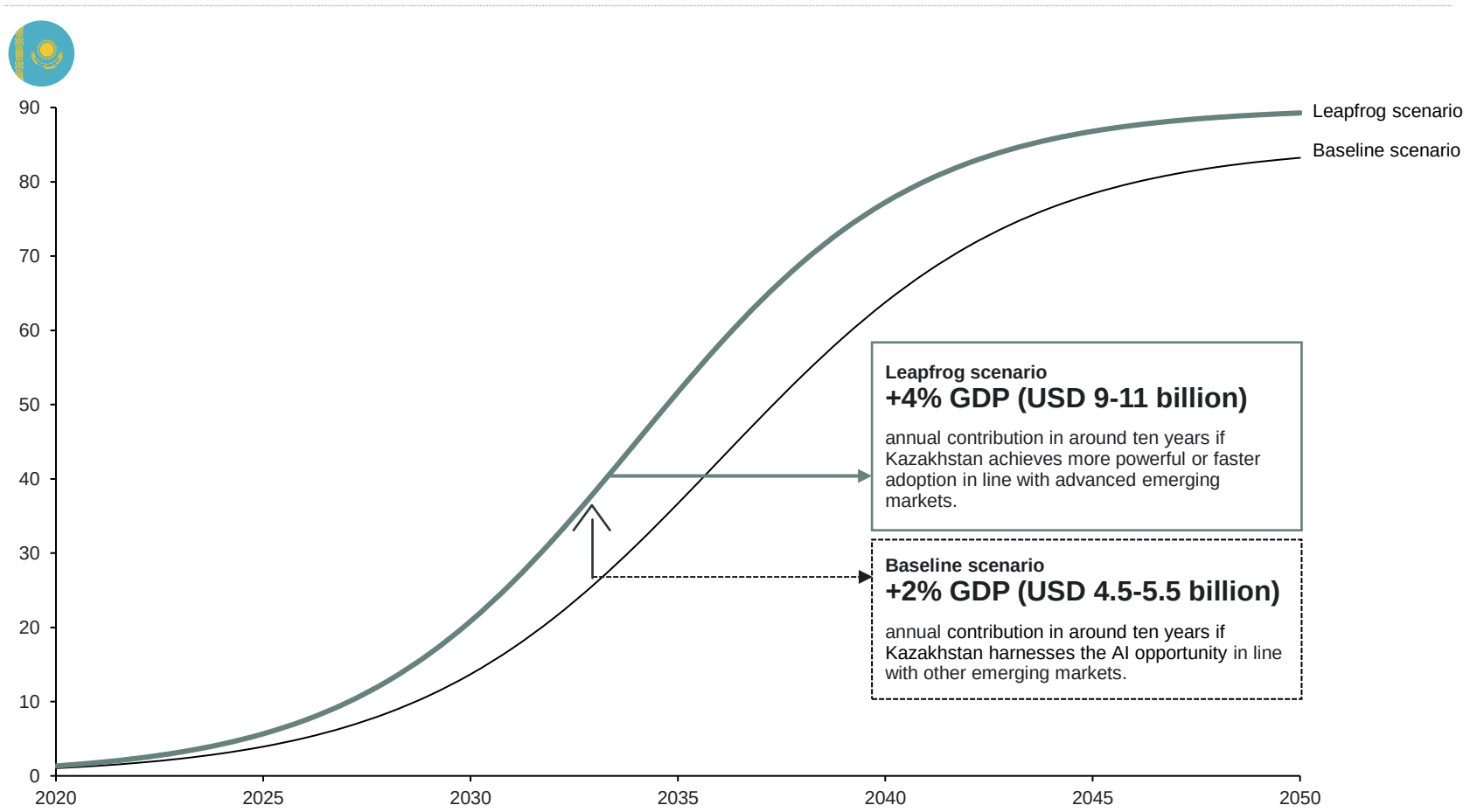


- Generative AI as a tool is most effective in automating knowledge-intensive tasks, such as those carried out in information, finance and business services.
- The largest productivity potentials are found in information and finance, where peak productivity increases roughly 2.8% annually. In public administration and business services, generative AI is estimated to increase value added by around USD 0.7 billion.
- The largest absolute impact is found in wholesale and retail, the largest sector in the Kazakh economy. Here, generative AI is estimated to increase value added by around USD 0.8 billion in ten years.
- The economic potential is also large in the mining and agricultural sector (USD 0.5 billion) despite a low peak annual productivity boost of 1.1%. This follows in part from the disproportionately large size of mining in this sector.
- In contrast to past automation, such as robots, generative AI has the ability to boost productivity in the service sector.

Note: Sectors are aggregated according to NACE categorisation. "Information and Finance" is a combination of information, communication, financial and insurance activities. Labour productivity gains are mapped one to one to GDP if total employment (as here) is assumed constant and the capital stock increases to match productivity improvements. The estimates take into account that the growth impact of generative AI may not be fully additive to the current GDP trend. AI-related gains may substitute for growth that would otherwise occur in a non-AI baseline. The contributions from generative AI shown are based on sectoral gross value added and are scaled to reflect the total GDP increase from generative AI. In line with Briggs and Kodnani (2023a), it is conservatively assumed that the agricultural sector is not impacted by AI in Kazakhstan.
Source: Implement Economics based on the Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National Statistics, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), National Statistics Bureau, and Dell'Acqua et al. (2023).

A leapfrog scenario could increase Kazakhstan's potential from generative AI from 2% to 4%

Adoption of generative AI



- Compared to other historical technological innovations, generative AI is more powerful, more user-friendly and easier to adopt.
- This presents a significant opportunity for less digitalised countries to leapfrog their digital development by skipping one generation of technology and going straight to the new generation of generative AI tools.
- To gauge the potential, we consider a *leapfrog scenario* where Kazakhstan succeeds in adopting generative AI with the same impact as most advanced emerging markets.
- If Kazakhstan can capture the benefits of generative AI in line with advanced emerging markets, the economic potential in ten years is estimated to increase from 2% (USD 4.5-5.5 billion) to 4% (USD 9-11 billion).
- The leapfrogging scenario may also mean that generative AI could not only be adopted faster but also provide more powerful boosts to productivity in industries that are lagging behind their more digitalised peers. The boost could potentially be bigger than quantified here.
- Leapfrogging would require a focused effort to significantly elevate key AI drivers in a short timeframe.

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Source: Implement Economics based on the Agency for Strategic planning and reforms of the Republic of Kazakhstan Bureau of National Statistics, O*Net, Briggs and Kodnani (2023a), BNP Paribas (2023), National Statistics Bureau, and Dell'Acqua et al. (2023).

5

Annex

Modelling the impacts of generative AI in Caucasus and Central Asia

Modelling the economic opportunity for Caucasus and Kazakhstan

Overview of the methodological approach to calculating economic growth and productivity impact from generative AI

The economic effects are calculated in the following steps

1. **Automation potential of work activities:** First, the exposure to generative AI is calculated by breaking down the automation potential of 39 different work activities/tasks in the occupational task database O*NET. The database includes an estimate of the share of each activity (e.g. getting information, performing administrative activities etc.) that can be automated by generative AI (if the activity is above level 4 on an O*NET-defined scale of difficulty 1-7, no automation potential is assumed).

2. **Mapping automation potential of work activities to occupations:** The automation potential of the work activities is mapped in ten industry aggregates in two sub-steps. First, the 39 work activities for 900 US occupations are mapped using importance-average activities for each occupation, providing an estimate of the share of each occupation's total workload that AI has the potential to automate. Secondly, this number is projected from US to ESCO occupations through the European Commission's crosswalk between ESCO and O*NET and finally compiled into aggregated occupations (using the sub-occupation employment). This leaves us with the three shares that describe how big a share of the work activities each occupation is expected to see: No automation, AI complement and Likely replacement.

3. **Quantifying productivity gains in each sector:** Generative AI is assumed to affect the productivity of the work activities for each occupation as follows (see section 3 for further details). The "No automation" share of work activities is assumed to be unaffected by generative AI. "AI complement" work activities experience a productivity boost from automation. "Likely replacement" is the share of work activities in a sector that is expected to be entirely automated/replaced. These workers are expected to be re-employed in slightly less productive jobs. The three effects are calculated across sectors and scaled by each sector's value added to determine the full productivity potential/generation of new jobs from generative AI across the economy, once the technology adoption peaks.

4. **Aggregate GDP impact:** Based on the estimated increase in labour productivity resulting from AI adoption, the result is aggregated to an overall GDP. Only part of the total long-run productivity increases from generative AI is expected to materialise in the economy during the initial ten-year period of technology adoption, following an S-curve adoption trajectory.

- The method used to calculate productivity and GDP effects of generative AI in this paper is in line with the methodology developed by Briggs and Kodnani (2023) in "The Potentially Large Effects of Artificial Intelligence on Economic Growth".
- Due to data limitations, the estimates for Kazakhstan and Azerbaijan assume a similar sectoral distribution of occupations as in neighbouring countries.

Note: The methodology is based on Briggs and Kodnani (2023a&b).
Source: Implement Economics based on the European Commission, National Statistical databases for Armenia, Azerbaijan, Georgia and Kazakhstan, O*Net and Briggs and Kodnani (2023a&b).

Authors
- Martin H. Thelle
- Sissel Marie Andersen
- Bodil Emilie Hovmand
- Nikolaj Tranholm-Mikkelsen
- Alexander Jagd Oure

Disclaimer

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The purpose of this Report is to assess the economic opportunity of generative AI in CCA, with a special focus on Armenia, Azerbaijan, Kazakhstan and Georgia.

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