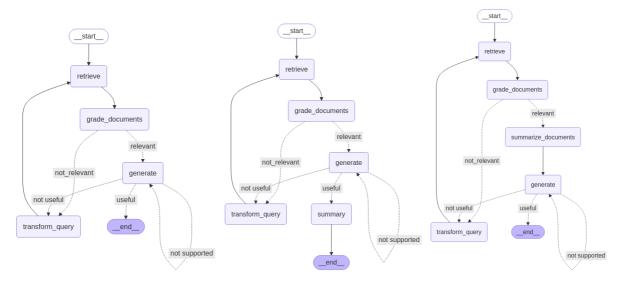
### **Sample Output Stitching Project**

### **By: Glenys Charity Lion**

### Al Agent Flow:

Here, I used the same AI Agent from Assignment 4 and combined it with a fine-tuned summarization model. I explored two variations of the AI Agent:

- Al Agent + Summary of the Generated Answer: The Al Agent generates an answer, then it will be summarized using the fine-tuned model in the end.
- Al Agent + Summary of Retrieved Documents: The Al Agent summarizes retrieved documents before generating an answering. It will make the response more concise and focused



Flowchart 1: Base Al Agent

Flowchart 2: Base AI Agent + Summarization of the generated answer using a fine-tuned model

**Flowchart 3:** Base Al Agent + Summarization of retrieved and graded documents using a fine-tuned model

### Differences:

- The **Base AI Agent** follows the same approach as in Assignment 4 and the lab session.
- The **second Al Agent** adds a summarization step after generating the answer.
- The **third Al Agent** summarizes documents only after checking their relevance. This will make sure that the final answer is more concise and noise-free, because it will focus on the relevant document summaries.

### **5 Examples Output:**

**1. Prompt:** What is happening to the Crypto market right now? Are there any news related to bitcoins and what are the implications of it?

#### Base LLM:

As of my last update in October 2023, I don't have real-time data or updates on the current state of the cryptocurrency market, including Bitcoin. However, I can provide some general insights into how to assess the market and what types of news typically impact Bitcoin and other cryptocurrencies.

- 1. \*\*Market Trends\*\*: The cryptocurrency market is known for its volatility. Prices can fluctuate significantly based on market sentiment, regulatory news, technological developments, and macroeconomic factors.
- 2. \*\*Regulatory News\*\*: Announcements from governments or regulatory bodies regarding cryptocurrency regulations can have a substantial impact on the market. Positive regulations can lead to price increases, while negative news can cause declines.
- 3. \*\*Adoption and Institutional Interest\*\*: News about major companies or financial institutions adopting Bitcoin or other cryptocurrencies can boost market confidence and drive prices up. Conversely, reports of major sell-offs or negative sentiment from institutional investors can lead to declines.
- 4. \*\*Technological Developments\*\*: Upgrades to blockchain technology, such as improvements in scalability or security, can positively influence market sentiment. Conversely, security breaches or technological failures can lead to negative reactions.
- 5. \*\*Market Sentiment\*\*: Social media trends, influencer opinions, and general public sentiment can also play a significant role in the price movements of cryptocurrencies.

To get the latest updates on Bitcoin and the cryptocurrency market, I recommend checking reputable financial news websites, cryptocurrency news platforms, and market analysis tools. Always consider multiple sources to get a well-rounded view of the current situation.

#### **Base RAGs:**

The crypto market is currently experiencing significant activity, with Bitcoin seeing a massive inflow of \$2.51 billion in just the past 20 hours. Bitcoin has reached a new record price of \$106,955.20, driven by optimism regarding potential regulatory easing by Donald Trump. A crypto analyst suggests that the current bull run may still have room for growth, indicating that the market is not near its peak yet. This creates uncertainty about Bitcoin's future trajectory and its implications for broader financial markets.

### **Base Advanced RAGs with Agents (without fine-tuning model):**

1. \*\*Bitcoin Trading Price\*\*: As per Benzinga Pro, Bitcoin was trading at \$1,06,955.20 at 8:13 am ET on Tuesday.

- 2. \*\*Market Activity\*\*: There was a mammoth \$2.51 billion in Bitcoin transactions in the past 20 hours.
- 3. \*\*Market Sentiment\*\*: Bitcoin hit a new record on optimism that Donald Trump will ease regulations surrounding cryptocurrencies.
- 4. \*\*Analyst Perspective\*\*: A crypto analyst reassured investors that the current bull run might still have room for growth, indicating that the market is not near a top and suggesting potential for further gains.
- 5. \*\*Stock Market Context\*\*: Stock markets mostly dropped while awaiting a Federal Reserve policy update.
- 6. \*\*Related News\*\*: Japan's MicroStrategy is set to issue 4.5 billion yen bonds to buy Bitcoin.

These details highlight the current dynamics in the crypto market, particularly regarding Bitcoin's price movements, significant transaction volumes, regulatory optimism, and investor sentiment.

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the generated answer):

Bitcoin was trading at \$1,06,955.20 at 8:13 am ET on Tuesday. The crypto analyst reassured investors that the current bull run might still have room for growth, indicating that the market is not near a top and suggesting potential for further gains. The crypto analyst reassured investors that the current bull run might still have room for growth, indicating that the market is not near a top and suggesting potential for further gains. The crypto analyst reassured investors that the current bull run might still have room for growth,

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the retrieved documents):

- 1. Bitcoin hit a new record on optimism that Donald Trump will ease regulations surrounding cryptocurrencies.
- 2. Stock markets are plummeting while awaiting a Federal Reserve policy update.
- 3. A crypto analyst reassured investors that the current bull run may still have room for growth, indicating that the market is not near a top and suggesting potential for further gains.
- 4. Japan's MicroStrategy is set to issue 4.5 billion yen bonds to buy Bitcoin.

#### **Comments:**

- **Base LLM:** Outdated news (October 2023)
- **Base RAGs:** simple answer based on news
- Base Advanced RAGs without fine tuning: answering the question in detail

- Advanced RAGs with fine-tuning model as the summarizer of the generated answer: summarizing the base advanced RAGs without fine tuning. It is useful when the task is summarization
- Advanced RAGs with fine-tuning model as the summarizer of the retrieved documents: concise summary with every important information on it
- Prompt: Anything happening to MicroStrategy company and stock?Base LLM:

As of my last update in October 2023, MicroStrategy has been known for its significant investments in Bitcoin and its strategy of using Bitcoin as a primary treasury reserve asset. The company's stock, traded under the ticker MSTR, has often been influenced by the price movements of Bitcoin, as well as its own business performance and strategic decisions.

For the latest news and stock performance, I recommend checking financial news websites, stock market platforms, or MicroStrategy's official communications. If you're looking for specific recent developments or trends, please let me know!

#### **Base RAGs:**

MicroStrategy's shares recently rose after the announcement that it will join the Nasdaq-100 index, but they later gave back some gains. The stock is currently down about 5% after a significant increase of 547% this year, largely driven by the rise in Bitcoin prices, which are around \$105,900.66. The index inclusion takes effect on December 23.

### **Base Advanced RAGs with Agents (without fine-tuning model):**

- 1. Shares of MicroStrategy were higher on a Monday after Nasdaq announced that the company would join the tech-heavy Nasdaq-100 index.
- 2. The stock was last lower by less than 1% after having jumped as much as 7% earlier in the day.
- 3. MicroStrategy's shares fell about 5% as the price of bitcoin's rally stalled around the \$100,000 level, but the stock remains up by almost 70% in the last month.
- 4. The inclusion in the Nasdaq-100 index will take effect on December 23.
- 5. In 2024, MicroStrategy's stock is up 547%, significantly outpacing the S&P 500's 26.9% advance.
- 6. The price of bitcoin last traded around \$105,900.66, up 2.6% on the day.

Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the generated answer):

MicroStrategy's shares were higher on a Monday after Nasdaq announced that the company would join the tech-heavy Nasdaq-100 index. 2. The stock fell about 5% as the price of bitcoin's rally stalled around the \$100,000 level, but the stock remains up by almost 70% in the last month. In 2024, MicroStrategy's stock is up 547%, significantly outpacing the S&P 500's 26.9% advance. 4. The price of bitcoin last traded around \$105,900.66, up 2.6% on the day. MicroStrategy's inclusion in the Nasdaq-100 index and the '

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the retrieved documents):

- 1. MicroStrategy's stock experienced fluctuations, giving back earlier gains after the inclusion of a bitcoin proxy in the Nasdaq-100 index and the 'QQQ' ETF.
- 2. Michael Saylor, chairman and CEO of MicroStrategy, is mentioned in relation to the company's activities.
- 3. MicroStrategy has been buying bitcoin "hand over fist" for its corporate treasury.
- 4. The stock remains up by almost 70% in the last month.
- 5. In 2024, MicroStrategy's stock is up 547%, which is significantly higher than the 26.9% advance of the Nasdaq index.
- 6. The price of bitcoin is noted to have stalled around the \$100,000 level.
- 7. The index inclusion for MicroStrategy takes effect on December 23.

#### Comments:

- **Base LLM:** Outdated news (October 2023)
- **Base RAGs:** simple answer based on news
- Base Advanced RAGs without fine tuning: answering the question in detail
- Advanced RAGs with fine-tuning model as the summarizer of the generated answer: summarizing the base advanced RAGs without fine tuning. It is useful when the task is summarization
- Advanced RAGs with fine-tuning model as the summarizer of the retrieved documents: concise summary with every important information on it
- 3. **Prompt:** Any problem with the US Stock market right now?

### Base LLM:

As of my last update in October 2023, I don't have real-time data or current market conditions. However, stock market issues can arise from various factors, including economic indicators, interest rates, inflation, geopolitical events, corporate earnings reports, and investor sentiment.

To get the most accurate and up-to-date information on the US stock market, I recommend checking financial news websites, stock market analysis platforms, or consulting with a financial advisor. They can provide insights into current trends, potential risks, and market performance.

#### **Base RAGs:**

Yes, there are problems with the US stock market right now. The S&P 500 and Nasdaq Composite both closed down 0.6%, and there is significant uncertainty as investors await interest rate decisions from the US Federal Reserve and other central banks, leading to hesitancy and selling pressure.

### Base Advanced RAGs with Agents (without fine-tuning model):

- 1. The S&P 500 closed down 0.6% at 6,052.85.
- 2. The Nasdaq Composite closed down 0.6% at 19,736.69.
- 3. The EUR is lower at USD1.0558 compared to USD1.0576.
- 4. The GBP is lower at USD1.2751 compared to USD1.2785.
- 5. The USD is higher at JPY151.38 compared to JPY151.19.
- 6. GOLD is flat at USD2,669.51 per ounce compared to USD2,669.43.
- 7. Brent crude is lower at USD71.78 a barrel compared to USD72.43.
- 8. The key economic event still to come on Tuesday is the US Redbook index at 13:55 GMT.
- 9. There is a lot of uncertainty in the market right now.
- 10. Investors are eagerly anticipating interest rate decisions from the US Federal Reserve, the Bank of England, and the Bank of Japan.
- 11. The consensus seems to be that the Fed will cut rates for the third time this year, but there's always a chance of a surprise.
- 12. This uncertainty is leading to some hesitancy and selling pressure.

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the generated answer):

The US Redbook index at 13:55 GMT. The key economic event still to come on Tuesday is the US Redbook index at 13:55 GMT. 10. Investors are eagerly anticipating interest rate decisions from the US Federal Reserve, the Bank of England, and the Bank of Japan. The consensus seems to be that the Fed will cut

rates for the third time this year, but there's always a chance of a surprise. This uncertainty is leading to some hesitancy and selling pressure. The S&P 500 closed down 0.6% at 6,052.85. The Nasdaq Composite closed down 0.6% at 19,736.69. The US Redbook index at 13:55 GMT.

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the retrieved documents):

- 1. The S&P 500 and Nasdaq are at record highs.
- 2. There are grounds for caution regarding the U.S. equity market.
- 3. Investors are anticipating interest rate decisions from the US Federal Reserve, the Bank of England, and the Bank of Japan.
- 4. The consensus is that the Fed will cut rates for the third time this year.
- 5. There is a chance of a surprise regarding the interest rate decisions, leading to hesitancy and selling pressure among investors.

**Comments:** same comments as the previous 2 outputs

- **Base LLM:** Outdated news (October 2023)
- **Base RAGs:** simple answer based on news
- Base Advanced RAGs without fine tuning: answering the question in detail
- Advanced RAGs with fine-tuning model as the summarizer of the generated answer: summarizing the base advanced RAGs without fine tuning. It is useful when the task is summarization
- Advanced RAGs with fine-tuning model as the summarizer of the retrieved documents: concise summary with every important information on it
- **4. Prompt:** How was the employment rate right now? Is the job market still in a tough condition?

### **Base LLM:**

I don't have real-time data access, so I can't provide the current employment rate or the state of the job market as of now. However, as of my last update in October 2023, the job market was showing signs of recovery in many regions, with varying conditions depending on the industry and location.

To get the most accurate and up-to-date information on the employment rate and job market conditions, I recommend checking reliable sources such as government labor statistics, economic reports, or news articles from reputable financial news outlets.

### **Base RAGs:**

The employment rate is steady, with the unemployment rate unchanged at 4.3%. While some sectors are still tough for job seekers, others continue to offer opportunities. Overall, the job market remains tight, with high wage levels and persistent wage growth.

### Base Advanced RAGs with Agents (without fine-tuning model):

- 1. The unemployment rate remained unchanged at 4.3% in the three months to October.
- 2. Employment is over 400k higher than previously thought, according to revisions included in the latest release.
- 3. The levels of unemployment, employment, and inactivity are broadly holding steady, indicating a tight labour market.
- 4. The jobs market continues to exhibit tightness with the unemployment rate remaining low at 4.3% and wage rises still elevated.
- 5. Wage growth has risen for the first time in a year, and high wage levels are persisting across the economy.
- 6. Vacancies have continued their stable downward trajectory and are now in touching distance of pre-pandemic levels.
- 7. There is a note of caution from the ONS regarding changes to the jobs survey.
- 8. Finding a job is likely to remain tough in some industries, particularly specific types of knowledge work, while other areas of the labour market continue to offer opportunities for jobseekers.

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the generated answer):

The ONS has issued a note of caution regarding changes to the jobs survey. 1. The unemployment rate remained unchanged at 4.3% in the three months to October. 2. Employment is over 400k higher than previously thought, according to revisions included in the latest release. 3. The levels of unemployment, employment, and inactivity are broadly holding steady, indicating a tight labour market. 4. The jobs market continues to exhibit tightness with the unemployment rate remaining low at 4.3% and wage rises still elevated. 5. Wage growth has risen for the first time in a year, indicating a tight labour market.

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the retrieved documents):

- The unemployment rate remained unchanged at 4.3% in the three months to October.
- Employment is over 400k higher than previously thought.

- The levels of unemployment, employment, and inactivity are broadly holding steady as the labor market remains tight.
- The jobs market continues to exhibit tightness with the unemployment rate remaining low at 4.3% and wage rises still elevated.
- Vacancies have continued their stable downward trajectory and are now in touching distance of pre-pandemic levels.
- Wage growth has risen for the first time in a year.
- Firms continue to grapple for talent.

**Comments:** same comments as the previous 3 outputs

- Base LLM: no real data access, outdated news (October 2023)
- Base RAGs: simple answer based on news
- Base Advanced RAGs without fine tuning: answering the question in detail
- Advanced RAGs with fine-tuning model as the summarizer of the generated answer: summarizing the base advanced RAGs without fine tuning. It is useful when the task is summarization
- Advanced RAGs with fine-tuning model as the summarizer of the retrieved documents: concise summary with every important information on it. More concise than the base advanced RAGs without fine tuning. Only keep information that is important
- 5. **Prompt:** Any problem with Facebook recently? Do you think Facebook will survive while there is a problem and why?

### **Base LLM:**

As of my last update in October 2023, Facebook (now part of Meta Platforms, Inc.) has faced various challenges, including issues related to privacy, misinformation, regulatory scrutiny, and competition from other social media platforms. These challenges have led to public criticism and calls for greater regulation.

Despite these issues, Facebook has a large user base and significant resources, which contribute to its resilience. The platform has been adapting by investing in new technologies, such as virtual and augmented reality, and focusing on community building and user engagement. Additionally, its integration with other services and platforms under the Meta umbrella, like Instagram and WhatsApp, helps maintain its relevance.

While challenges remain, Facebook's ability to innovate and adapt, along with its vast user base, suggests that it is likely to survive in the long term. However, its

future will depend on how effectively it addresses ongoing issues and navigates the evolving landscape of social media and technology.

#### **Base RAGs:**

Yes, Facebook has faced a problem recently due to a data breach that affected around 29 million accounts. Meta has acknowledged the breach and intends to challenge the decision, citing proactive measures taken to address the issue.

As for survival, while the breach poses challenges, Facebook's proactive response and ongoing efforts to rectify weaknesses may help it navigate through this situation.

### **Base Advanced RAGs with Agents (without fine-tuning model):**

- 1. \*\*Breach Acknowledgment\*\*: Meta has acknowledged a data breach that initially impacted 50 million users, which was later specified to involve around 29 million accounts.
- 2. \*\*Proactive Measures\*\*: Meta cited proactive measures taken to rectify the identified weaknesses, including notifying those affected and liaising with both the FBI and multiple regulators.
- 3. \*\*Intention to Challenge\*\*: Meta has voiced its intention to challenge the decision regarding the breach.
- 4. \*\*Scams on Platform\*\*: Labour's Williams stated, "The Commerce Commission should be tooled to confront those problems at both a bank level, and a social media level." This reflects a sentiment that Facebook suffers no penalty for scams originating on its platform, as echoed by Westpac CEO Catherine McGrath, who contended that scams are a "pipe" and that banks are pressured and regulated to attend to their end of it.

These details highlight the challenges Facebook faces regarding data security and accountability for scams on its platform.

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the generated answer):

Meta has acknowledged a data breach that initially impacted 50 million users, which was later specified to involve around 29 million accounts. Meta cited proactive measures taken to rectify the identified weaknesses, including notifying those affected and liaising with both the FBI and multiple regulators. This reflects a sentiment that Facebook suffers no penalty for scams originating on its platform, as echoed by Westpac CEO Catherine McGrath, who contended that scams are a "pipe" and that banks are pressured and regulated to address their end of it.

# Base Advanced RAGs with Agents (with fine-tuning model as the summarizer of the retrieved documents):

- 1. Meta has expressed its intention to challenge the decision regarding a breach that initially impacted 50 million users, which was later specified to involve around 29 million accounts.
- 2. The tech giant cited proactive measures taken to rectify the identified weaknesses, including notifying those affected and liaising with both the FBI and multiple regulators.
- 3. In New Zealand, scams are reported to result in at least \$200 million a year lost, with underreporting indicated by Netsafe.
- 4. There are repeated attempts to report blatant examples of paid scam advertisements on Facebook, which almost always end up with no action taken.

**Comments:** same comments as the previous 4 outputs

- Base LLM: Outdated news (October 2023)
- **Base RAGs:** simple answer based on news
- Base Advanced RAGs without fine tuning: answering the question in detail
- Advanced RAGs with fine-tuning model as the summarizer of the generated answer: summarizing the base advanced RAGs without fine tuning. It is useful when the task is summarization
- Advanced RAGs with fine-tuning model as the summarizer of the retrieved documents: concise summary with every important information on it. More concise than the base advanced RAGs without fine tuning. Only keep information that is important. But the summarization may remove some important information as well. So, in the future, need to improve the fine-tuned model for the summarizer to make even better answer.

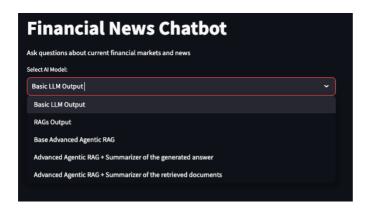
#### **CONCLUSION:**

- **Base LLM:** It will give an outdated news (October 2023)
- Base RAGs: Base RAGs will give more updated news with the retrieved documents
- **Base Advanced RAGs without fine tuning:** It improve base RAGs even better. It generates more detail answer, checking everything is related to the question and reduce hallucination.
- Advanced RAGs with fine-tuning model as the summarizer of the generated answer: It creates the summary of the generated answer. So, it is an improvement on the base advanced RAGs. It will be useful when the task is to do a summarization of the generated answer.

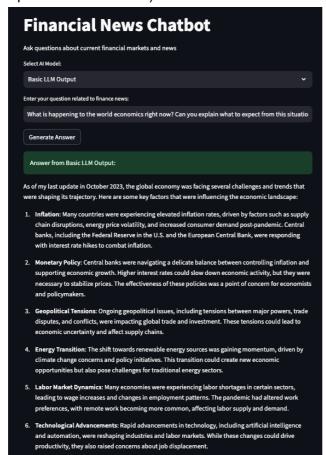
- Advanced RAGs with fine-tuning model as the summarizer of the retrieved documents: It will summarized the retrieved documents. In the end, the generated answer will be more concise and remove the unimportant noise. By this, I would prefer doing the summarization before generating the answer, since it will create a more concise answer.

### Sample Output Web App:

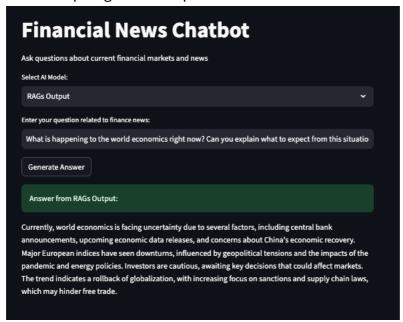
Ask the user to select which model to use



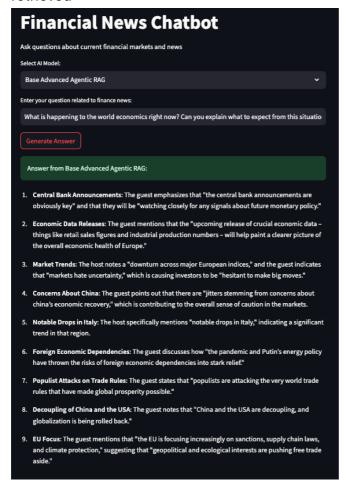
1. Base LLM Output: It gave the answer from October 2023 (which is not an updated information)



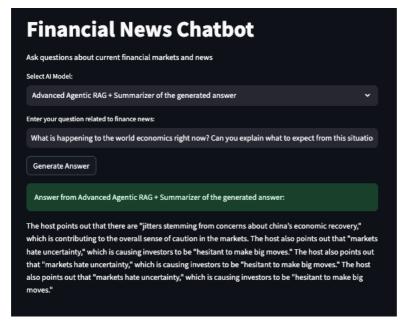
2. RAGs Output: give the output from the retrieved documents



3. Base Advanced Agentic RAG: giving more detail answer based on the documents retrieved



4. Advanced Agentic RAG + Summarizer of the generated answer: having a summarized answer based on part 3



5. Advanced Agentic RAG + Summarizer of the retrieved documents: summarizing the retrieved documents to have a more concise answer

## **Financial News Chatbot** Ask questions about current financial markets and news Select AI Model: Advanced Agentic RAG + Summarizer of the retrieved documents Enter your question related to finance news: What is happening to the world economics right now? Can you explain what to expect from this situatio Generate Answer Answer from Advanced Agentic RAG + Summarizer of the retrieved documents: 1. Central Bank Announcements: The documents highlight that "the central bank announcements are obviously key" and that there will be close monitoring for "any signals about future monetary policy." ${\bf 2.} \quad \textbf{Upcoming Economic Data: It is noted that "the upcoming release of crucial economic data - things$ like retail sales figures and industrial production numbers - will help paint a clearer picture of the overall economic health of Europe." 3. Downturn in European Indices: The documents mention a "downturn across major European indices" and inquire about the driving factors behind this trend. 4. Cross-Border Impacts: There is a reference to "cross-border impacts" and the potential for these decisions to influence the US economy, with a request for elaboration on how this could play out. 5. Market Uncertainty: It is stated that "markets hate uncertainty, and until these key decisions are announced, investors are hesitant to make big moves." 6. Concerns About China's Economic Recovery: The documents indicate that "jitters stemming from concerns about china's economic recovery" are contributing to the overall sense of caution. 7. Notable Drops in Italy: The documents confirm that there are "particularly notable drops in Italy." 8. Foreign Economic Dependencies: The text mentions that "the pandemic and Putin's energy policy have thrown the risks of foreign economic dependencies into stark relief." 9. Populist Attacks on World Trade Rules: It is noted that "populists are attacking the world trade rules that have made global prosperity possible."

10. Decoupling of China and the USA: The documents state that "China and the USA are decoupling, and

11. EU Focus on Sanctions and Supply Chain Laws: It is mentioned that "the EU is focusing increasingly on sanctions, supply chain laws, and climate protection – geopolitical and ecological interests are

globalization is being rolled back."

pushing free trade aside."