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Impact of technology, trade, and structural reform on employment

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Motivation (1)

- "I want German car companies to become American car companies. I want them to build their plants here." Donald Trump, 24 September 2024.
- "Flexible labour … markets are essential…. The gains from reforms will clearly be larger when reforms are more ambitious … Further labour market reform is also necessary and will help to reduce structural unemployment." (ECB, 2014, p. 62).
- Research reports mixed results on the impact of trade and technological progress and reform on employment.

Motivation (2)

What we do:

- 1. Using Bayesian Model Averaging, Terzides et al. (2025) conduct a meta-regression analysis of 397 technology and 355 trade employment elasticities from 56 studies in order to draw conclusions from this research base.
- 2. Wiese et al. (2025) examine the impact of large labour market reforms on employment in 26 OECD countries between 1970-2020 using recently proposed methodology.

Impact of trade and technology (1)

- To what extent have globalization (trade) and technological change influenced employment patterns in advanced economies?
- It is well known that methodological, specification, and data differences affect empirical estimates. These differences can lead to heterogeneity in reported estimates.
- Meta-regression analysis helps to explain why results differ systematically within and between studies.

Impact of trade and technology (2)

- It is based on a focused examination of the role of methodological, specification, and data factors on, in our case, the reported technology and trade employment elasticities.
- Heckscher-Ohlin-Stolper-Samuelson (HOSS) models: countries export goods that intensively use their abundant production factors, with price changes influencing factor utilization. This suggests a decline in high-skilled employment in advanced economies.

Impact of trade and technology (3)

- 1980s saw the opposite—rising high-skilled employment despite higher relative wages—indicating the role of skill-biased technological change. For HOSS effects to be significant, trade flows must be large, but U.S. import volumes were too small to explain labor market shifts.
- As a result, technology was considered the main driver of employment changes. Technological progress increases demand for high-skilled workers and may make low-skilled jobs obsolete.

Impact of trade and technology (4)

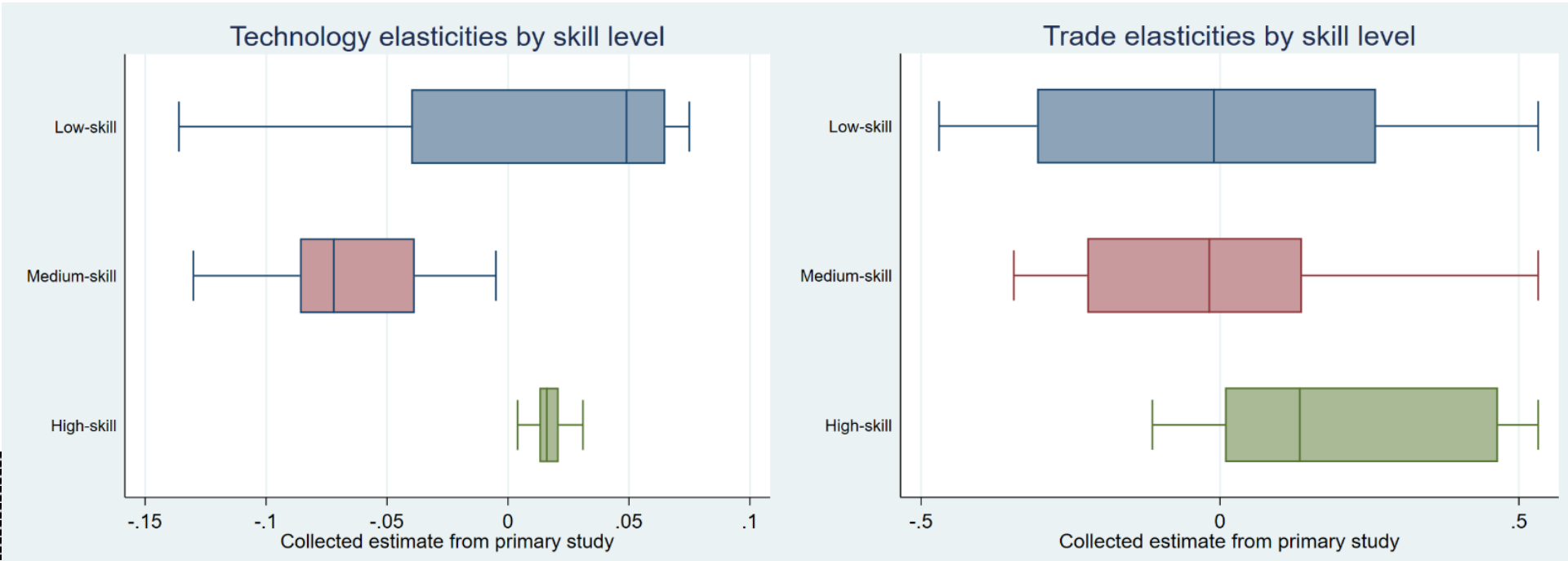
- It can also substitute labor through process innovations and affect sectors unevenly. However, trade and technology effects are hard to separate because both can explain labor outcomes.
- While technology generally raises demand for high-skilled labor, results differ by country and method. Some studies suggest low-skilled workers benefit, but others show job losses.
- Trade's impact is similarly debated.

Impact of trade and technology (5)

- Following standard meta-regression approach, we end up with 56 high-quality studies that measured how technology or trade impact employment.
- From each of these studies, we collect as many labor market impact estimates (employment elasticities) as possible.
- Employment elasticities measure the responsiveness of employment to changes in technology or trade. This resulted in nearly 400 estimates for technology and over 350 for trade.

Figure 1. Distributions of estimated technology and trade elasticities by skill level

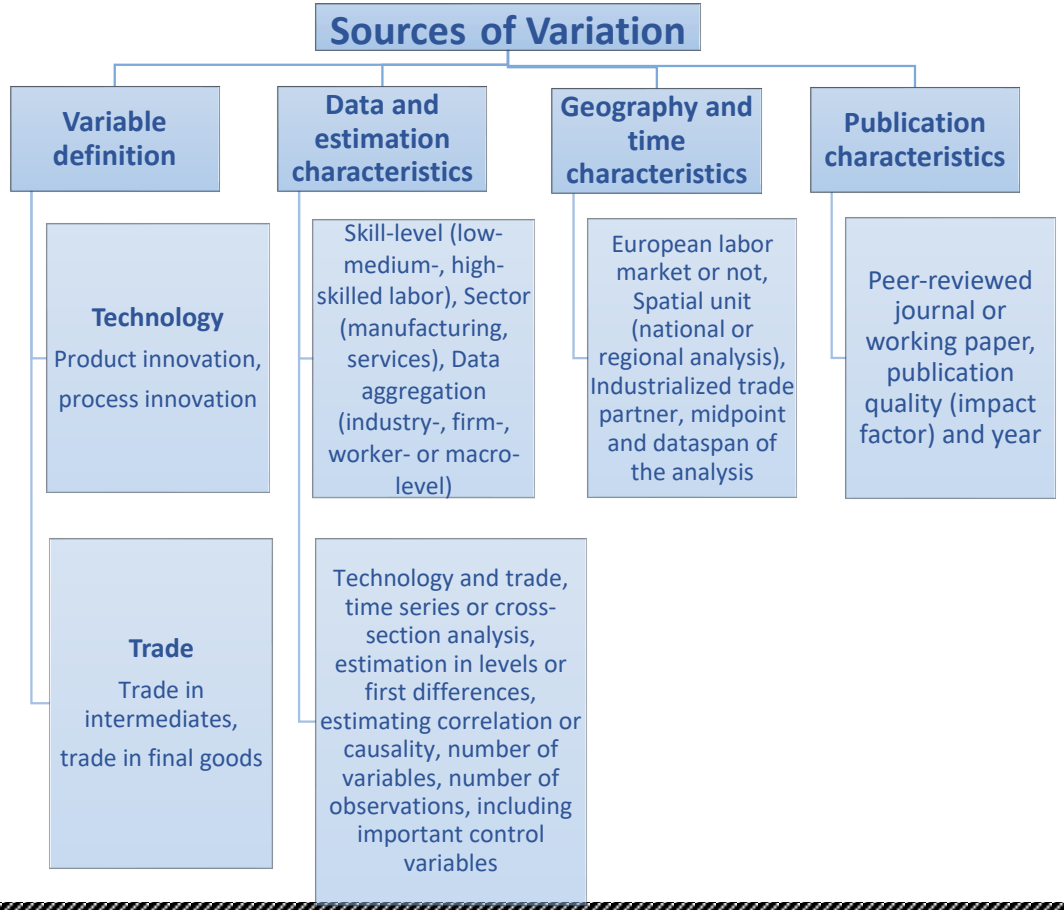
Notes: Vertical lines inside the boxed indicate the median values by skill level (technology sample: 0.049 for low-skill, -0.072 for medium skill and 0.016 for high skill and trade sample: -0.010 for low-skill, -0.018 for medium skill and 0.133 for high skill). The median is the value for which 50% of the data lies on its left-hand side and 50% lies on the right-hand side. The left edge of the box represents the lower quartile, while the right edge of the box shows the upper quartile. The values at the extremes of the horizontal lines are the lowest and highest reported elasticities.



Impact of trade and technology (6)

- Fig. 1 is just summarizing studies considered, without accounting for differences across these studies.
- A meta-analysis identifies the most relevant factors that could explain differences between various studies and draws robust inferences from the evidence base, such as country under consideration, the time period considered, skill levels, the type of technological progress, the econometrics used, but also whether and where the study has been published.
- Figure 2 shows all these factors considered.

Figure 2. Study characteristics considered in the meta-regression analysis



Impact of trade and technology (7)

- Bayesian Model Averaging (BMA) approach implies that we estimate all possible combinations of variables considered and identify the "best" models based on the the posterior inclusion probability (PIP), measuring the importance of each variable.
- To interpret the PIP, we follow the thresholds used in the literature, suggesting that PIPs below 0.5 suggest no significance.
- Table 1 reports the PIPs of the variables that have a PIP above 0.50.

Table 1. Explaining the variation in the technology and trade meta-samples

Response variable	Technology PIP	Trade PIP
Product innovation	1.000	
Low skill	1.000	1.000
Medium skill	1.000	1.000
High skill	1.000	1.000
Technology and trade	1.000	0.610
Europe	1.000	
Industry level	1.000	
Estimation in levels	0.999	
Peer reviewed journal	0.998	
Firm level	0.988	
Data span	0.968	
Number of observations	0.955	
St. error	0.894	
Manufacturing	0.866	
Services	0.732	0.768
Advanced		0.786
Developing		0.917
10-year impact factor of the journal		0.583
Studies	37	19
Observations	397	355

Impact of trade and technology (8)

- Our analysis shows that the impact of technology on employment differs across skill levels. According to the BMA results, the reported elasticities are 0.025 higher for low-skilled workers and 0.049 higher for high-skilled workers than those for medium-skilled workers.
- The impact of trade on employment also differs between different skill levels. The BMA results show that the reported elasticities are 0.095 lower for low-skilled workers, while the reported elasticities are 0.062 higher for high-skilled workers.

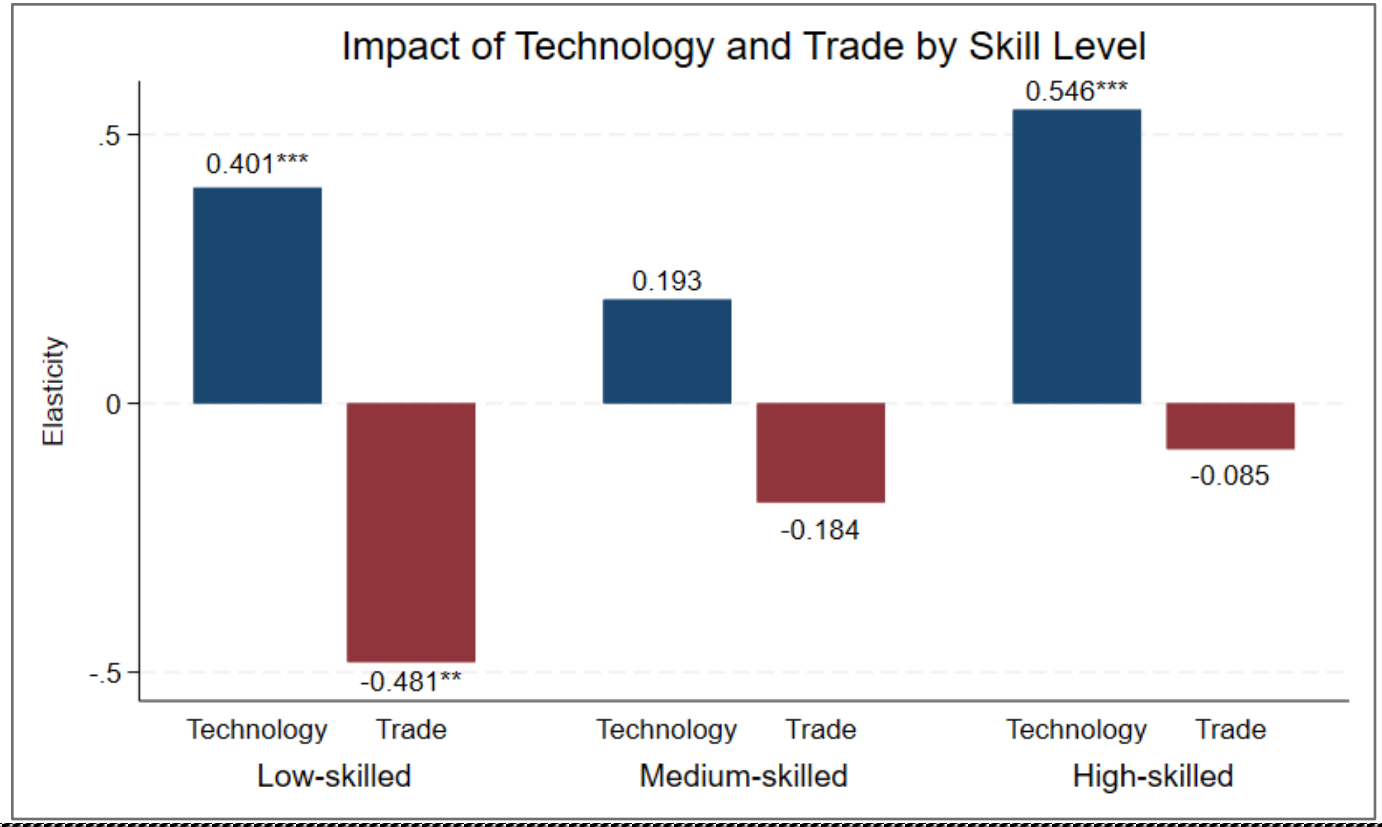
Impact of trade and technology (9)

- We can use the BMA estimates to come up with a synthetic estimate, often called 'best practice'. We proceed in two steps.
- **1.** Our most preferred methodology relates to models using first differences, while the model should include both technology and trade variables as well as important controls. Estimation using time series with a time lag and instrumental variable approach. We also assume that the trade takes place between a European and a developing economy. Finally, study should have recently been published in a high quality peer-reviewed journal.

Impact of trade and technology (10)

- **2.** For each of the variables that we include in the synthetic estimate we multiply the estimated marginal effect of the variable with the maximum value of this variable in the technology or trade sample.
- For example, the maximum value of the 10-year impact factor of a journal in which a trade study has been published is 23.76 and this is multiplied with the estimated marginal effect according to the BMA, which amounts to -0.017.

Figure 3. Best practice estimated technology and trade elasticities



Impact of reform (1)

- We examine the impact of large labour market reforms on employment in 26 OECD countries between 1970-2020.
- Our difference-in-difference local projection (LP) method takes into account that structural reforms both can increase or reduce either labour market flexibility or the generosity of unemployment benefits.
- Major reforms are identified by Duval et al. (2018) and updated until 2020 by Wiese et al. (2024). The database also includes “counter-reforms”.

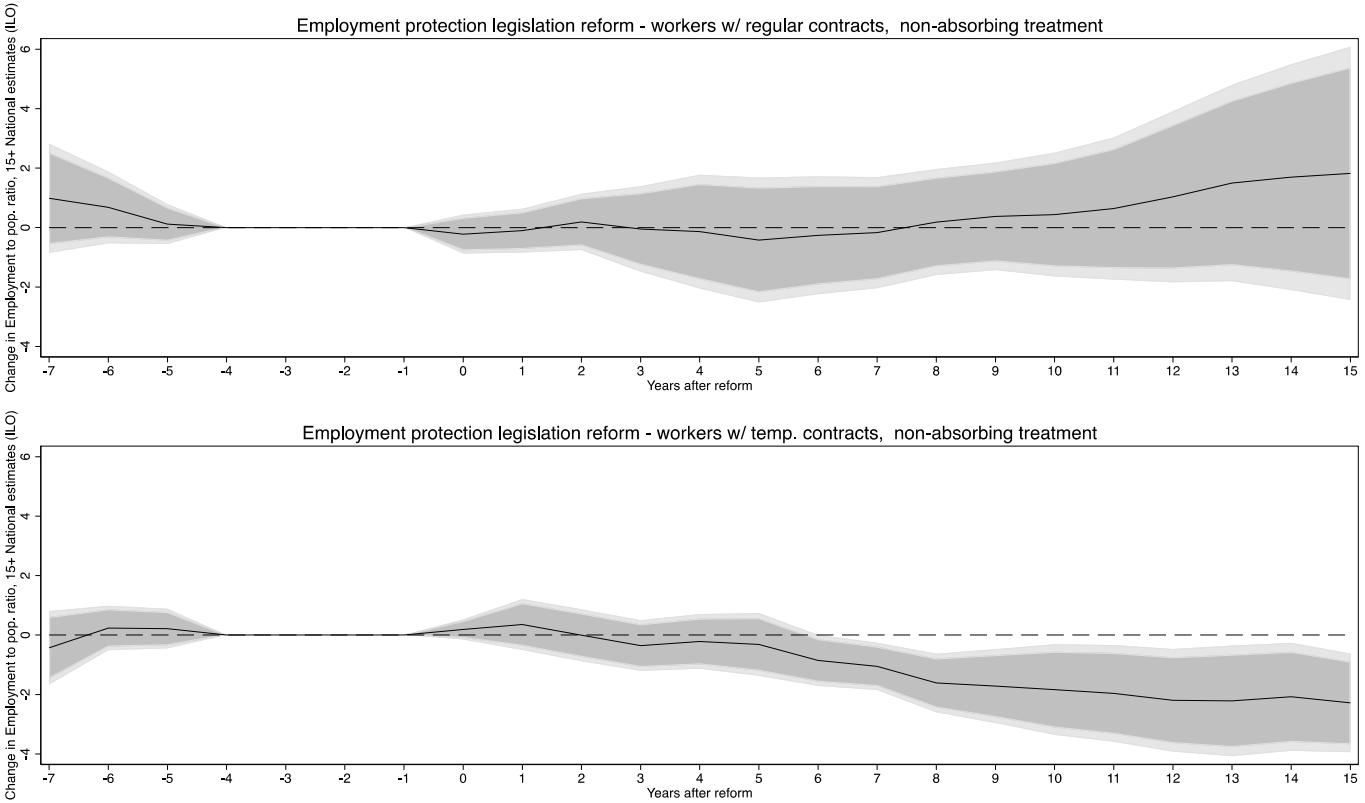
Impact of reform (2)

- Reforms: employment protection legislation (EPL) and unemployment benefits (UB) reforms, capturing that it becomes easier to fire employees and reductions in the level of unemployment benefits, respectively.
- We also distinguish between reforms for employees with fixed versus temporary contract.
- Previous studies ignore whether observations have been previously treated and therefore should disqualify as useable observations.

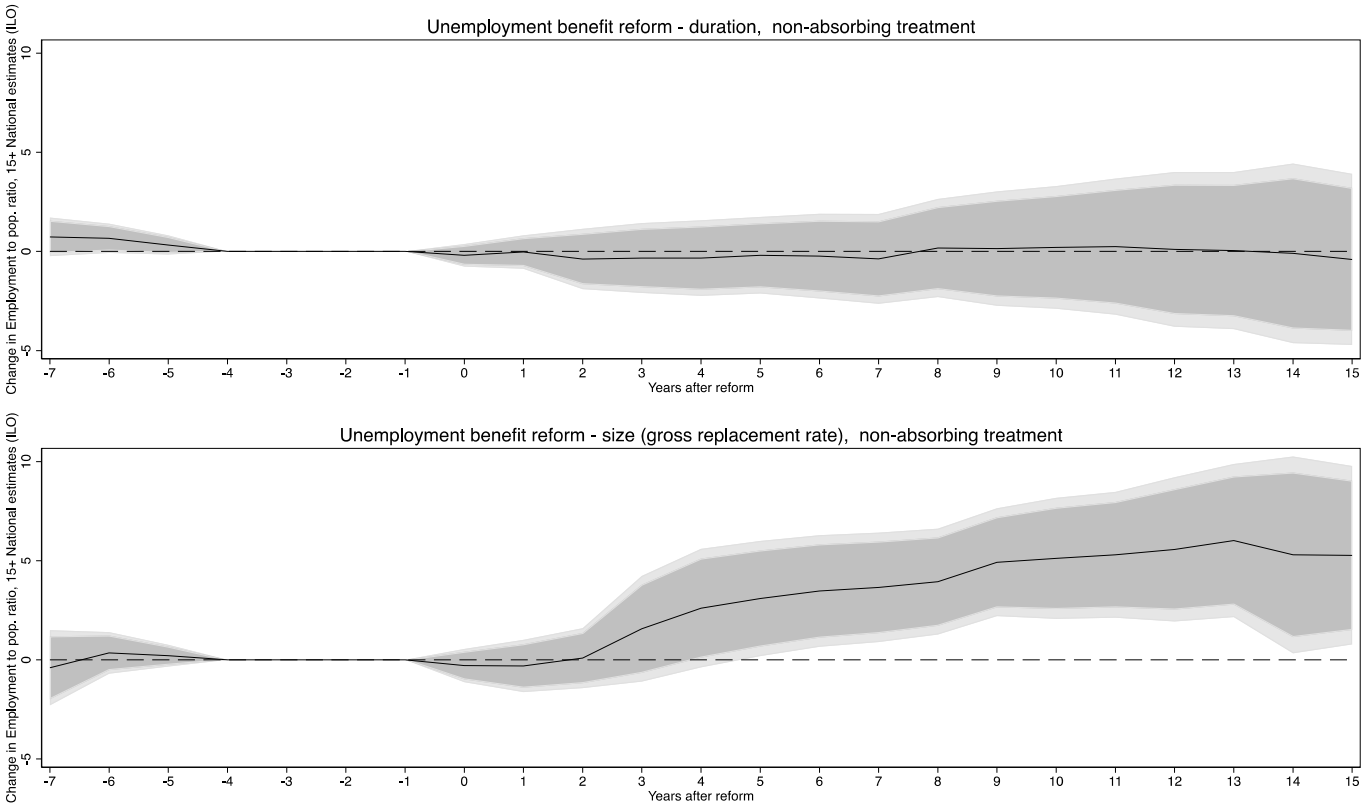
Impact of reform (3)

- Likewise, many studies also do not take counter-reforms into account. If there are counter reforms in the forecast horizon, estimated effect of reforms may be biased.
- Therefore, we take a new approach and use a modified version of the LP-DID approach developed by Dube et al. (2023) which allows us to address these issues.

Impact of EPL reform on employment



Impact of UB reform on employment



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Thank you for your attention