sciendo

ECONOMICS
Innovative and Economics
Research Journal

LAMPIRAN KORESPONDENSI ARTIKEL PADA JURNAL INTERNASIONAL BEREPUTASI

Profile* Artikel

Judul artikel	:	*Currency exchange rate volatility as a moderating effect of the gold and coal price against fund age and mutual fund in indonesia*
Nama penulis	:	Musdalifah Azis, Tetra Hidayati, Zainal Abidin, Muhamad Sukor Jaafar
Corresponding authors	:	Tetra Hidayati
Nama jurnal	:	ECONOMICS - Innovative and Economic Research Journal
Indeks jurnal	:	SCImago (SJR)
Quartile	:	Q2 - 0.511
Penerbit	:	Sciendo, Germany
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p-ISSN	:	2303-5005
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Link DOI	:	https://doi.org/10.2478/eoik-2024-0041
Web jurnal	:	https://economicsrs.com/index.php/eier/index
Sistem pengulas	:	*Double-blind review*

Timeline Peer-Review*

Tanggal-Bulan-Tahun	Rentetan	Deskripsi
17 Juni 2024	Kronologi 1	Registrasi (OJS) & verifikasi artikel
18 Juni 2024	Kronologi 2	Konfirmasi pengiriman, arahan editorial & komitmen penulis
24 Juni 2024	Kronologi 3	Penyerahan hasil ulasan tahap awal (ronde satu)
27 Juni 2024	Kronologi 4	Perbaikan artikel (revisi pertama)
15 Juli 2024	Kronologi 5	Penyerahan hasil ulasan tahap lanjutan (ronde dua)
15 s/d 17 Juli 2024	Kronologi 6	Perbaikan kembali perbaikan artikel (revisi kedua) & tanggapan editor
20 Juli 2024	Kronologi 7	Penyerahan hasil ulasan tahap awal (ronde tiga)
20 Juli 2024	Kronologi 8	Pengiriman koreksi artikel (revisi ketiga)
22 Juli 2024	Kronologi 9	Tanggapan editor terhadap ketiga revisi (ronde empat)
24 Juli 2024	Kronologi 10	Respon penulis lewat revisi lanjutan (revisi keempat)
29 Juli 2024	Kronologi 11	Komentar editor terhadap perbaikan lanjutan (ronde lima)
01 Agustus 2024	Kronologi 12	Pelampiran kembali atas revisi dari penulis & verifikasi editorial (revisi kelima)
06 Agustus 2024	Kronologi 13	Rekomendasi seputar koreksi editorial (ronde enam)

07 Agustus 2024	Kronologi 14	Penyempurnaan koreksi akhir oleh penulis (revisi keenam)
07 Agustus 2024	Kronologi 15	Penyuntingan & pengumuman status artikel (*accepted*)
07 Agustus 2024	Kronologi 16	Pemberitahuan pembayaran artikel
07 Agustus 2024	Kronologi 17	Pelaporan artikel versi akhir (pasca *editing*) & balasan editor
12 Agustus 2024	Kronologi 18	Notifikasi teknis pembayaran artikel
13 Agustus 2024	Kronologi 19	Penginformasian transaksi pembayaran
17 Agustus 2024	Kronologi 20	Justifikasi rincian kepengarangan & koreksi referensi
19 Agustus 2024	Kronologi 21	Proses produksi artikel
20 Agustus 2024	Kronologi 22	Pemutakhiran artikel (pra-cetak) & penandatanganan *open access lisence*
25 s/d 26 November 2024	Kronologi 23	Komunikasi terkait penomoran halaman & jawaban edior
27 November 2024	Kronologi 24	Penerbitan artikel di laman jurnal

Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

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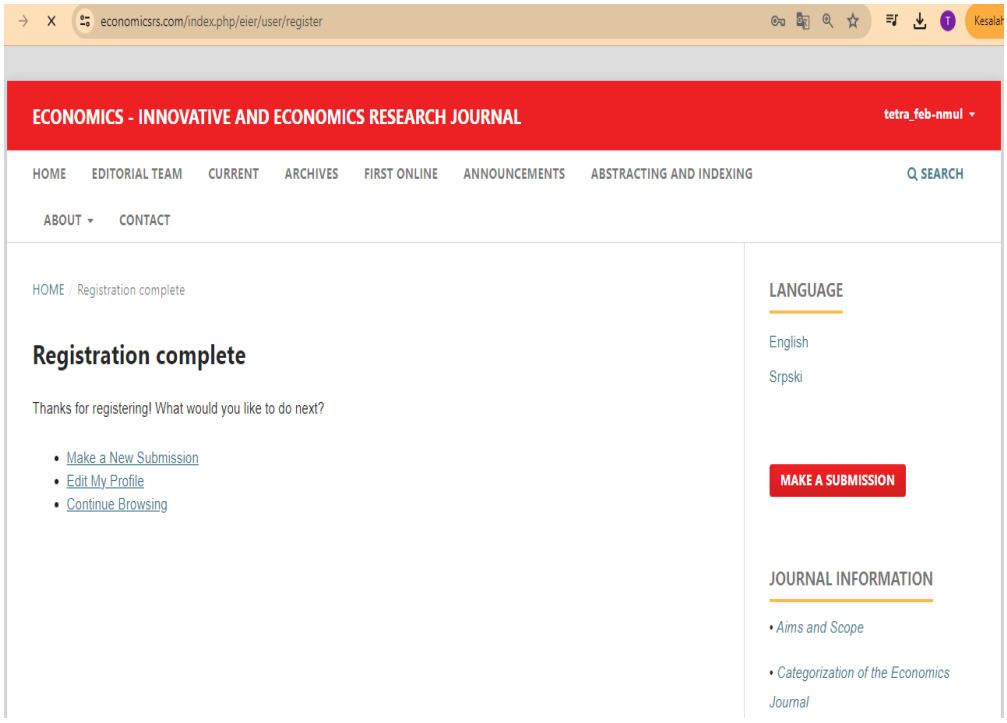
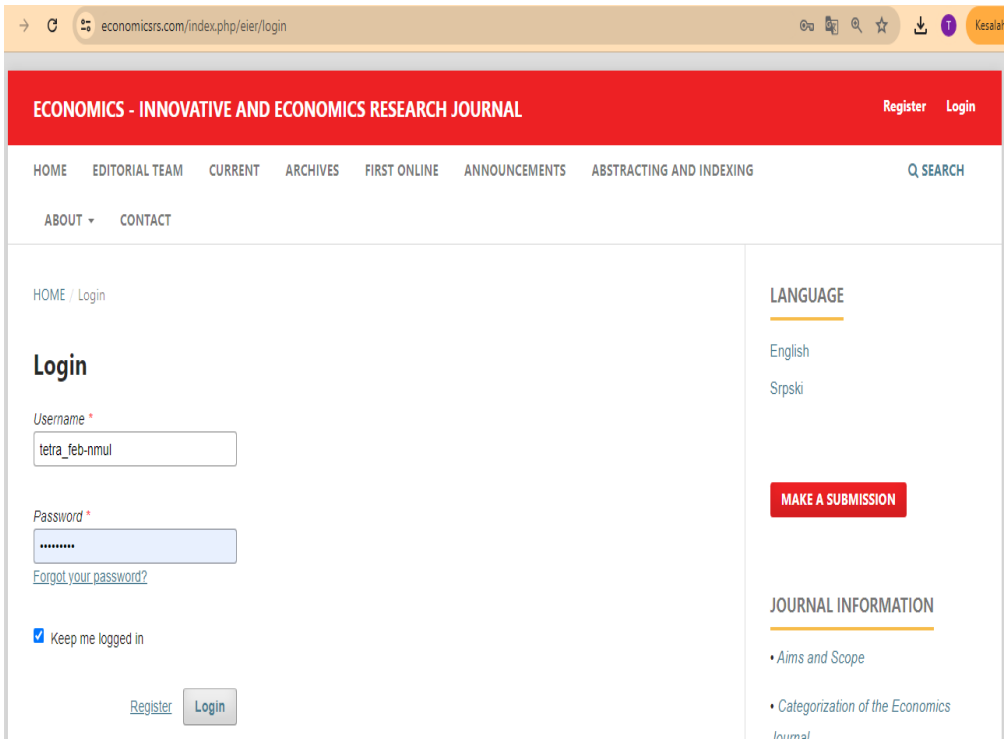
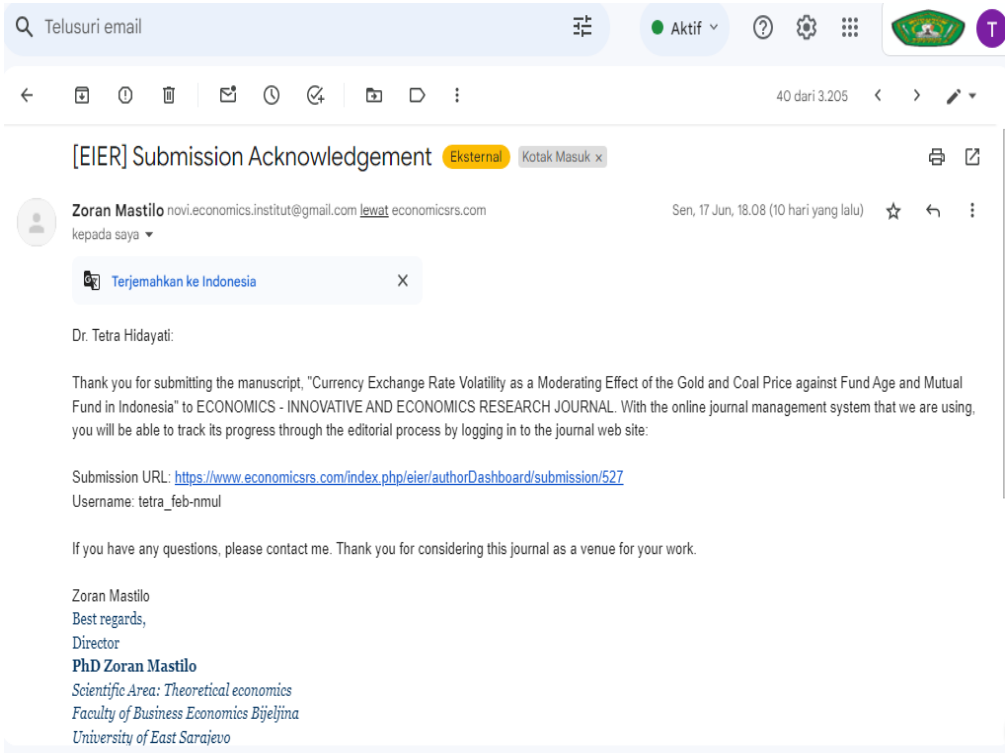
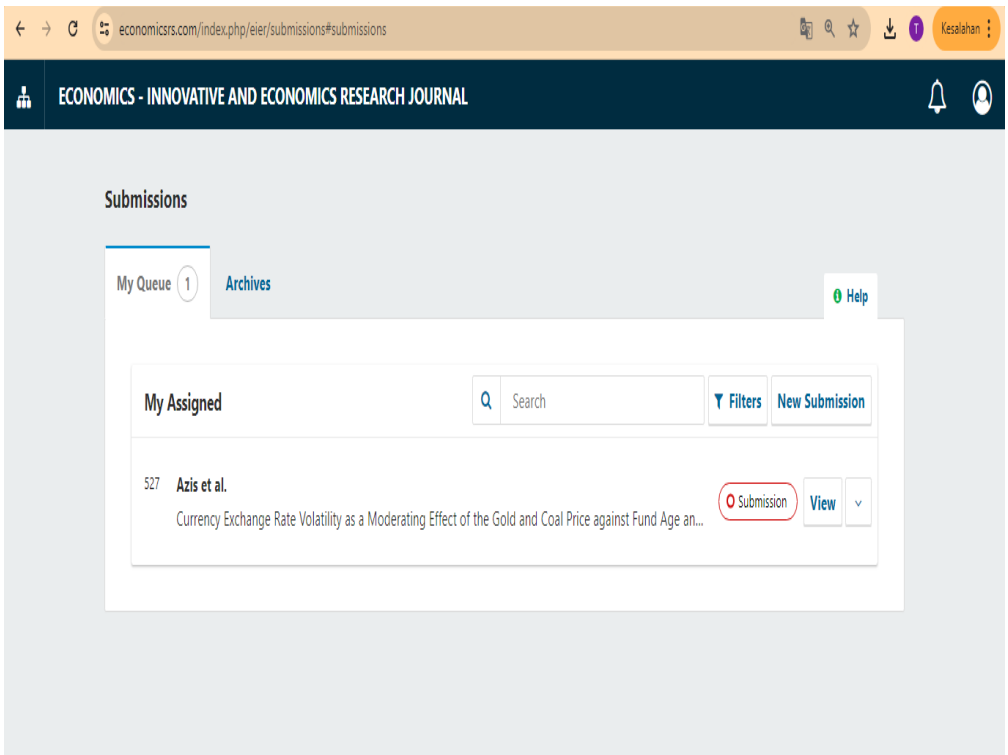
Kronologi 1: Registrasi (OJS) & verifikasi artikel - 17 Juni 2024






Telusuri email
Aktif
40 dari 3.205
[EIER] Submission Acknowledgement
Eksternal
Kotak Masuk
Zoran Mastilo novi.economics.institut@gmail.com lewat economicsrs.com
kepada saya
Sen, 17 Jun, 18.08 (10 hari yang lalu)
Terjemahkan ke Indonesia
Dr. Tetra Hidayati:
Thank you for submitting the manuscript, "Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia" to ECONOMICS - INNOVATIVE AND ECONOMICS RESEARCH JOURNAL. With the online journal management system that we are using, you will be able to track its progress through the editorial process by logging in to the journal web site:
Submission URL: https://www.economicsrs.com/index.php/eier/authorDashboard/submission/527
Username: tetra_feb-nmul
If you have any questions, please contact me. Thank you for considering this journal as a venue for your work.
Zoran Mastilo
Best regards,
Director
PhD Zoran Mastilo
Scientific Area: Theoretical economics
Faculty of Business Economics Bijeljina
University of East Sarajevo


economicsrs.com/index.php/eier/submissions#submissions
Kesalahan
ECONOMICS - INNOVATIVE AND ECONOMICS RESEARCH JOURNAL
Submissions
My Queue 1
Archives
Help
My Assigned
Search
Filters
New Submission
527 Azis et al.
Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age an...
Submission
View

Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

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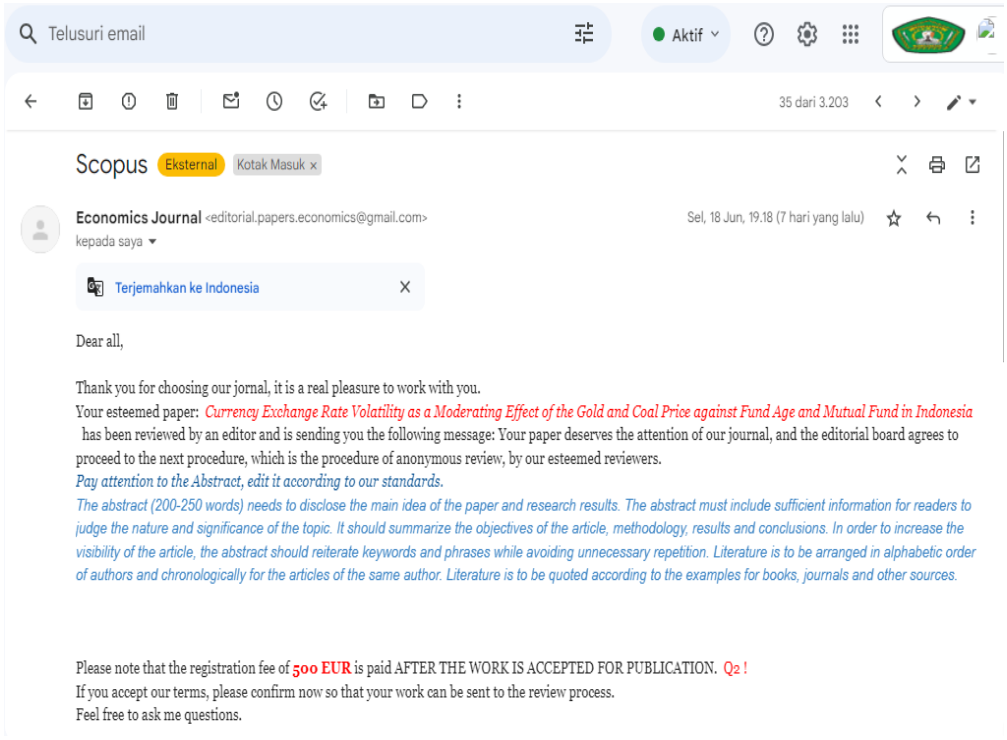
Kronologi 2: Konfirmasi pengiriman, arahan editorial & komitmen penulis - 18 Juni 2024



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35 dari 3.203

Scopus Eksternal Kotak Masuk ×

Economics Journal <editorial.papers.economics@gmail.com> Sel, 18 Jun, 19.18 (7 hari yang lalu)

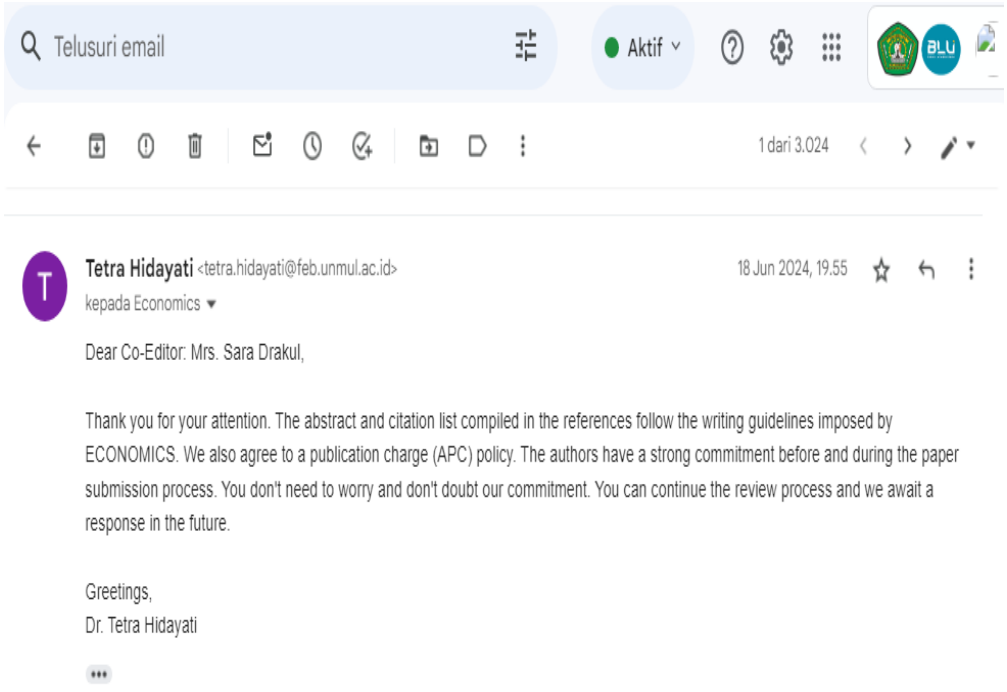
kepada saya

Terjemahkan ke Indonesia

Dear all,

Thank you for choosing our jornal, it is a real pleasure to work with you.
Your esteemed paper: *Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia* has been reviewed by an editor and is sending you the following message: Your paper deserves the attention of our journal, and the editorial board agrees to proceed to the next procedure, which is the procedure of anonymous review, by our esteemed reviewers.
Pay attention to the Abstract, edit it according to our standards.
The abstract (200-250 words) needs to disclose the main idea of the paper and research results. The abstract must include sufficient information for readers to judge the nature and significance of the topic. It should summarize the objectives of the article, methodology, results and conclusions. In order to increase the visibility of the article, the abstract should reiterate keywords and phrases while avoiding unnecessary repetition. Literature is to be arranged in alphabetic order of authors and chronologically for the articles of the same author. Literature is to be quoted according to the examples for books, journals and other sources.

Please note that the registration fee of **500 EUR** is paid AFTER THE WORK IS ACCEPTED FOR PUBLICATION. Q2 !
If you accept our terms, please confirm now so that your work can be sent to the review process.
Feel free to ask me questions.



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1 dari 3.024

Tetra Hidayati <tetra.hidayati@feb.unmul.ac.id> 18 Jun 2024, 19.55

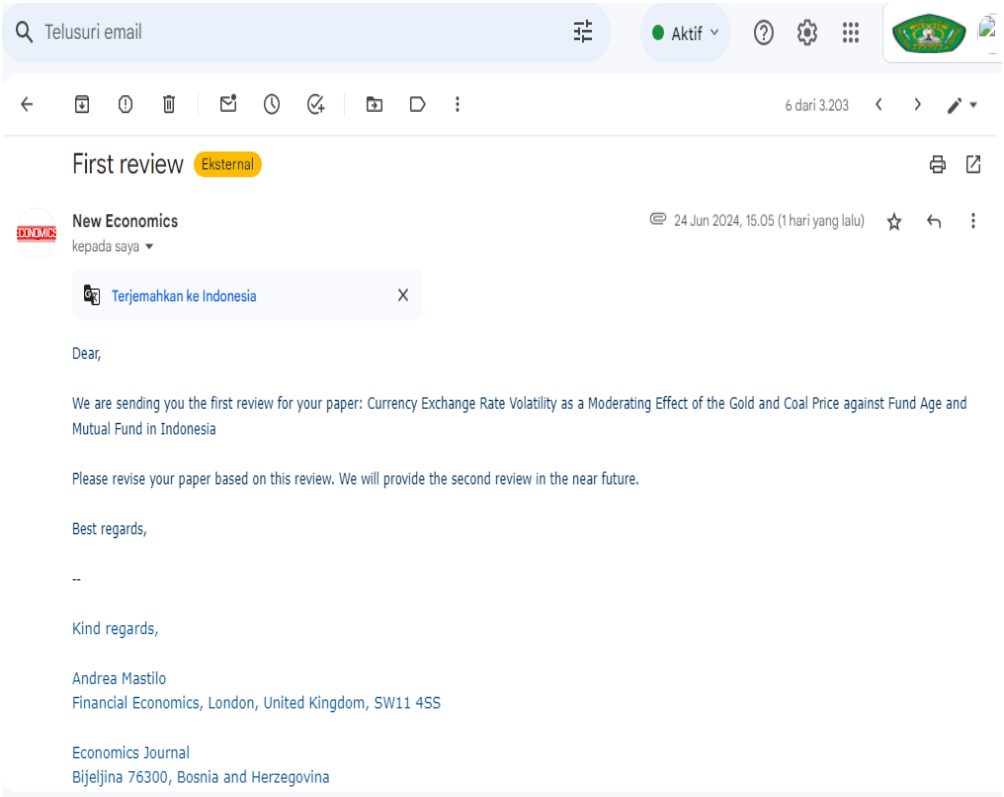
kepada Economics

Dear Co-Editor: Mrs. Sara Drakul,

Thank you for your attention. The abstract and citation list compiled in the references follow the writing guidelines imposed by ECONOMICS. We also agree to a publication charge (APC) policy. The authors have a strong commitment before and during the paper submission process. You don't need to worry and don't doubt our commitment. You can continue the review process and we await a response in the future.

Greetings,
Dr. Tetra Hidayati

Kronologi 3: Penyerahan hasil ulasan tahap awal (ronde satu) - 24 Juni 2024



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6 dari 3.203

First review Eksternal

New Economics
kepada saya

24 Jun 2024, 15.05 (1 hari yang lalu)

Terjemahkan ke Indonesia

Dear,

We are sending you the first review for your paper: Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Please revise your paper based on this review. We will provide the second review in the near future.

Best regards,

--

Kind regards,

Andrea Mastilo
Financial Economics, London, United Kingdom, SW11 4SS

Economics Journal
Bijeljina 76300, Bosnia and Herzegovina

Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

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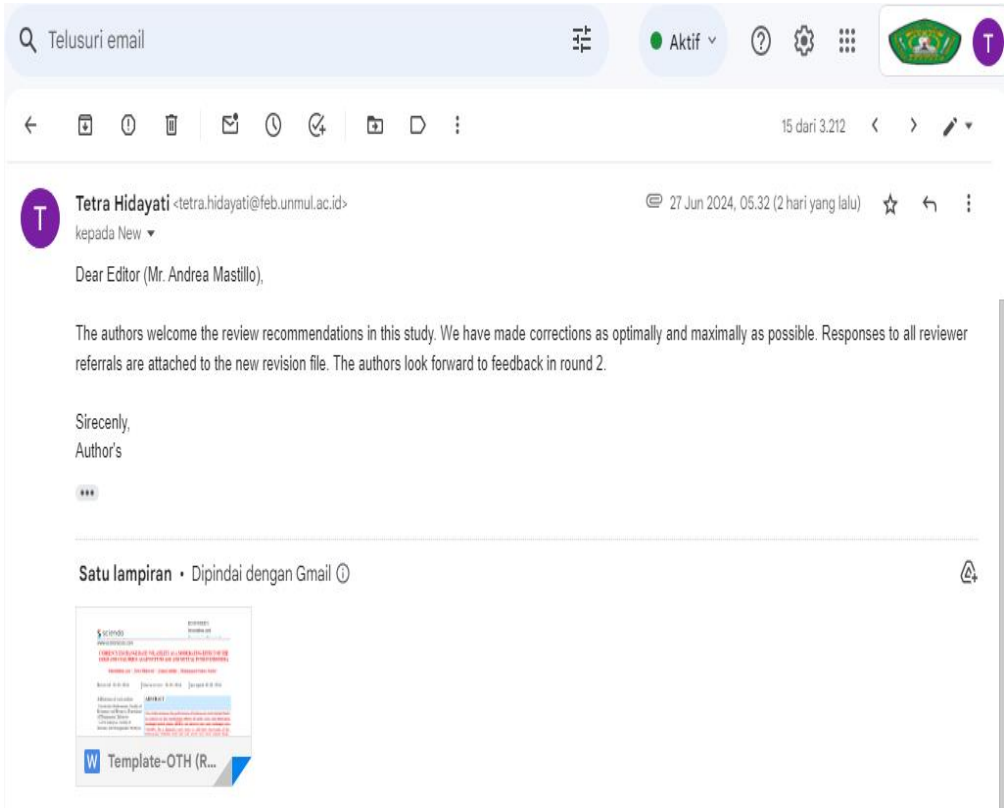
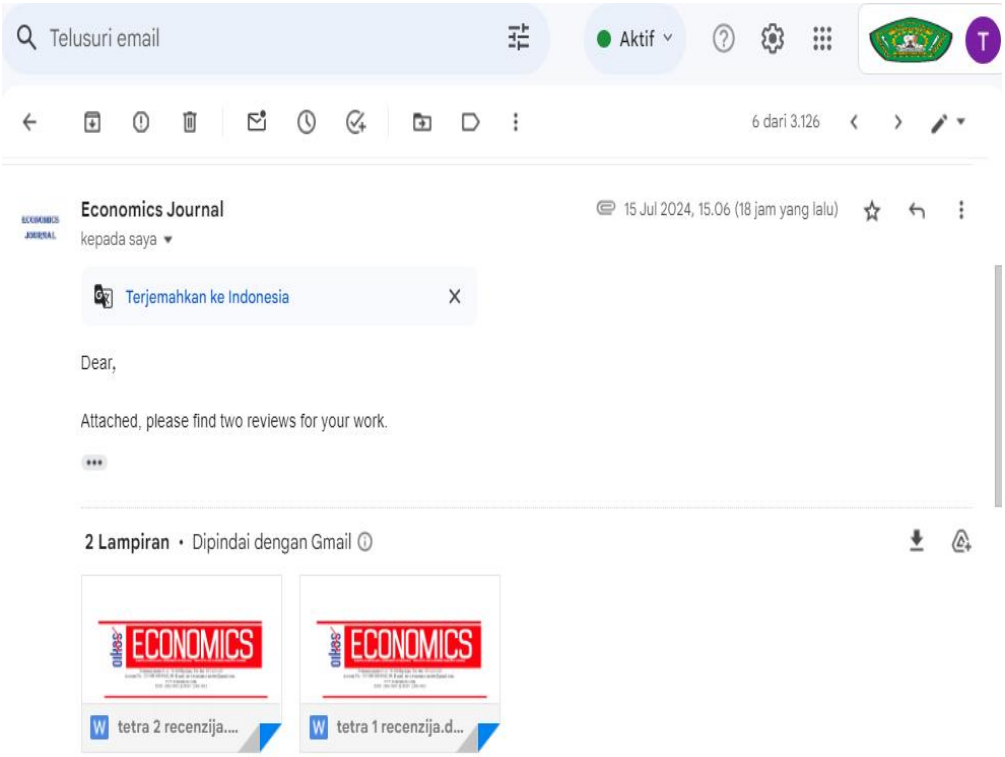
Kronologi 4: Perbaikan artikel (revisi pertama) - 27 Juni 2024

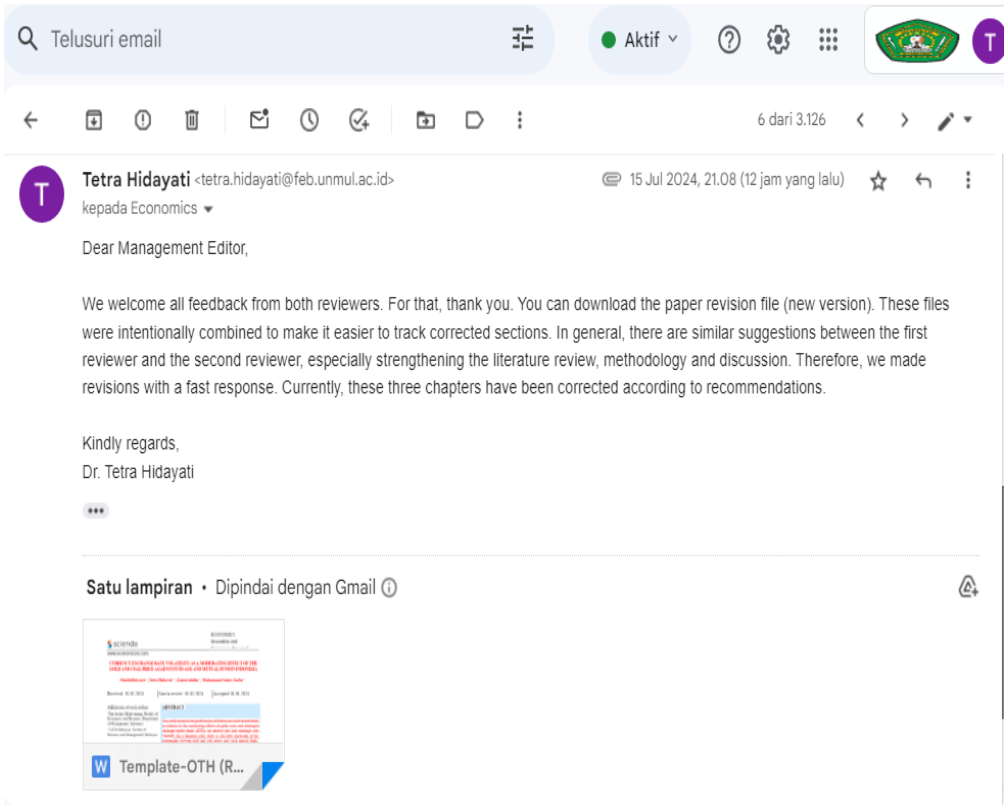


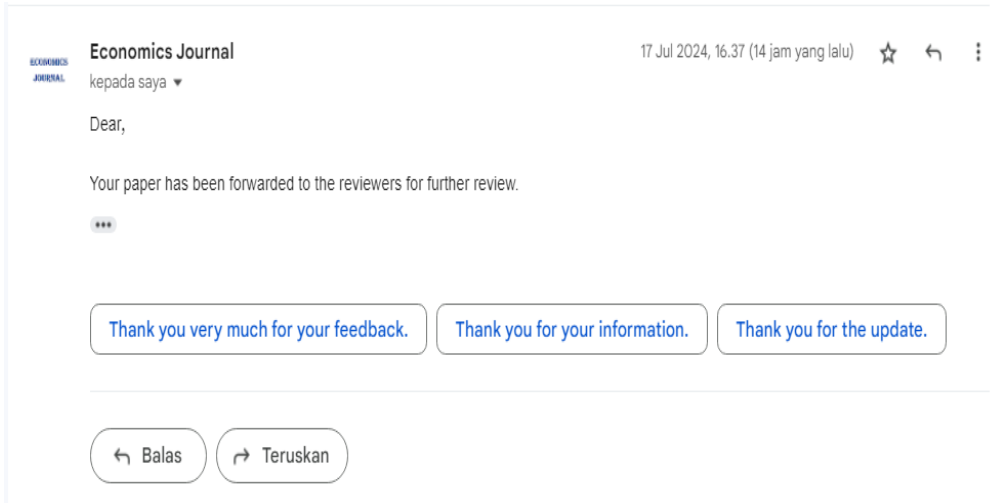
Kronologi 5: Penyerahan hasil ulasan tahap lanjutan (ronde dua) - 15 Juli 2024



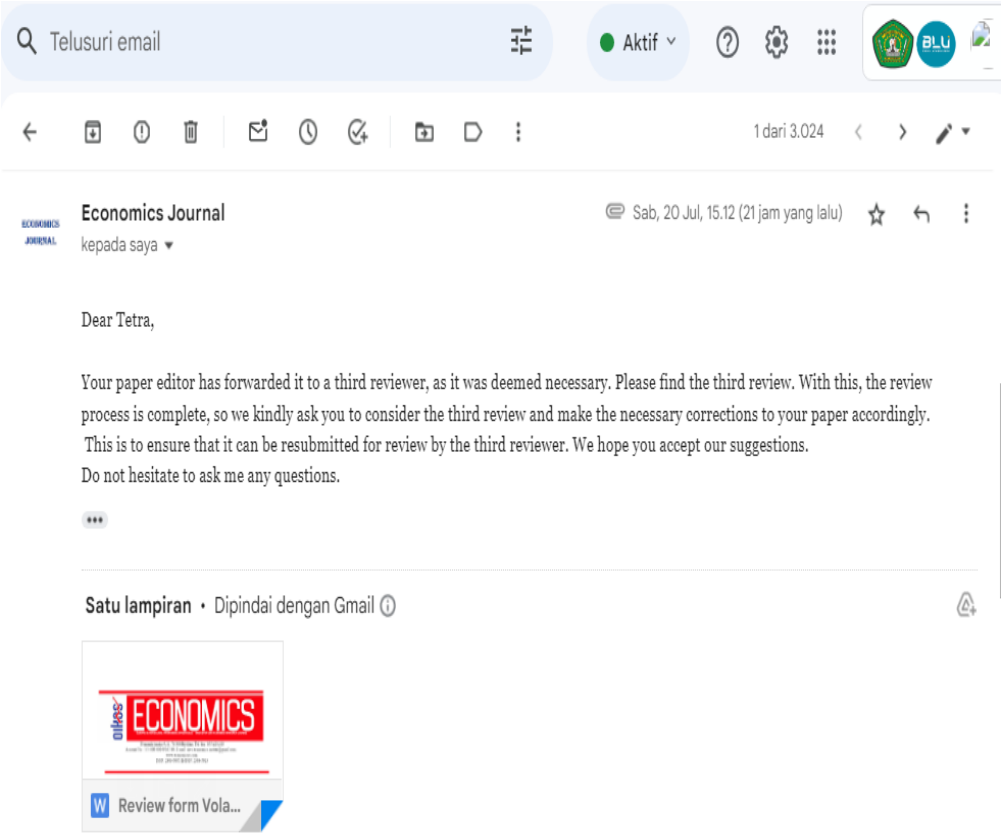
Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Kronologi 6: Perbaikan kembali perbaikan artikel (revisi kedua) & tanggapan editor - 15 s/d 17 Juli 2024



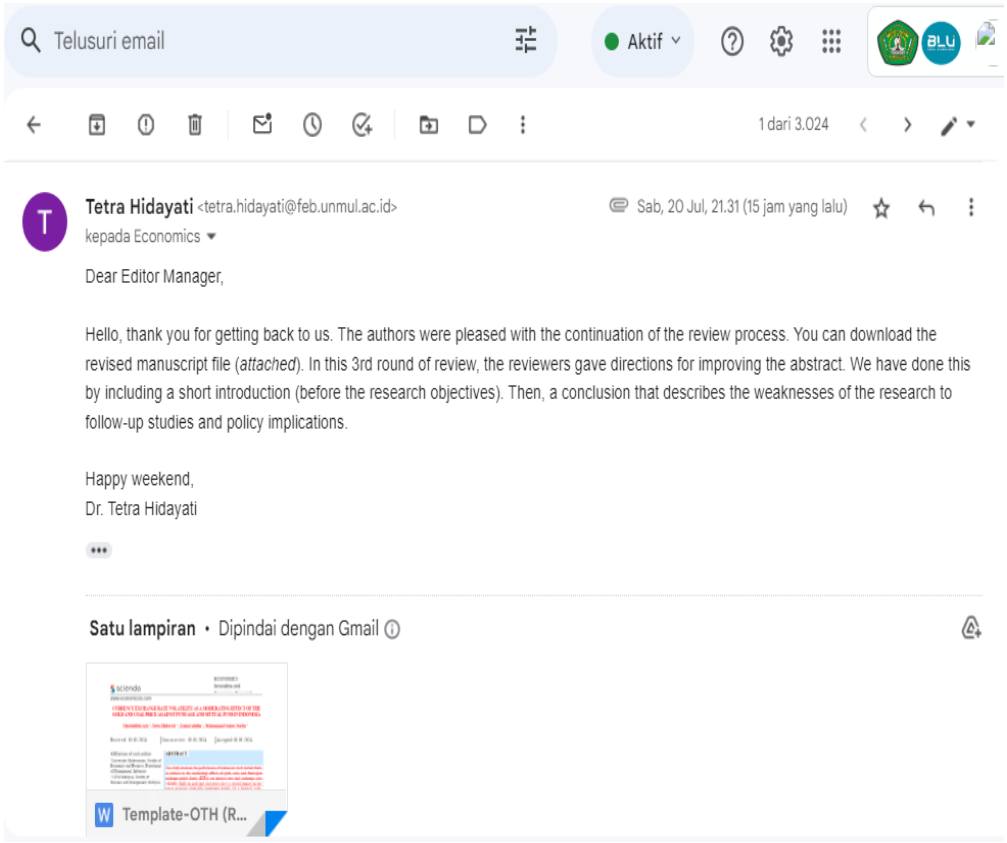


Kronologi 7: Penyerahan hasil ulasan tahap awal (ronde tiga) - 20 Juli 2024

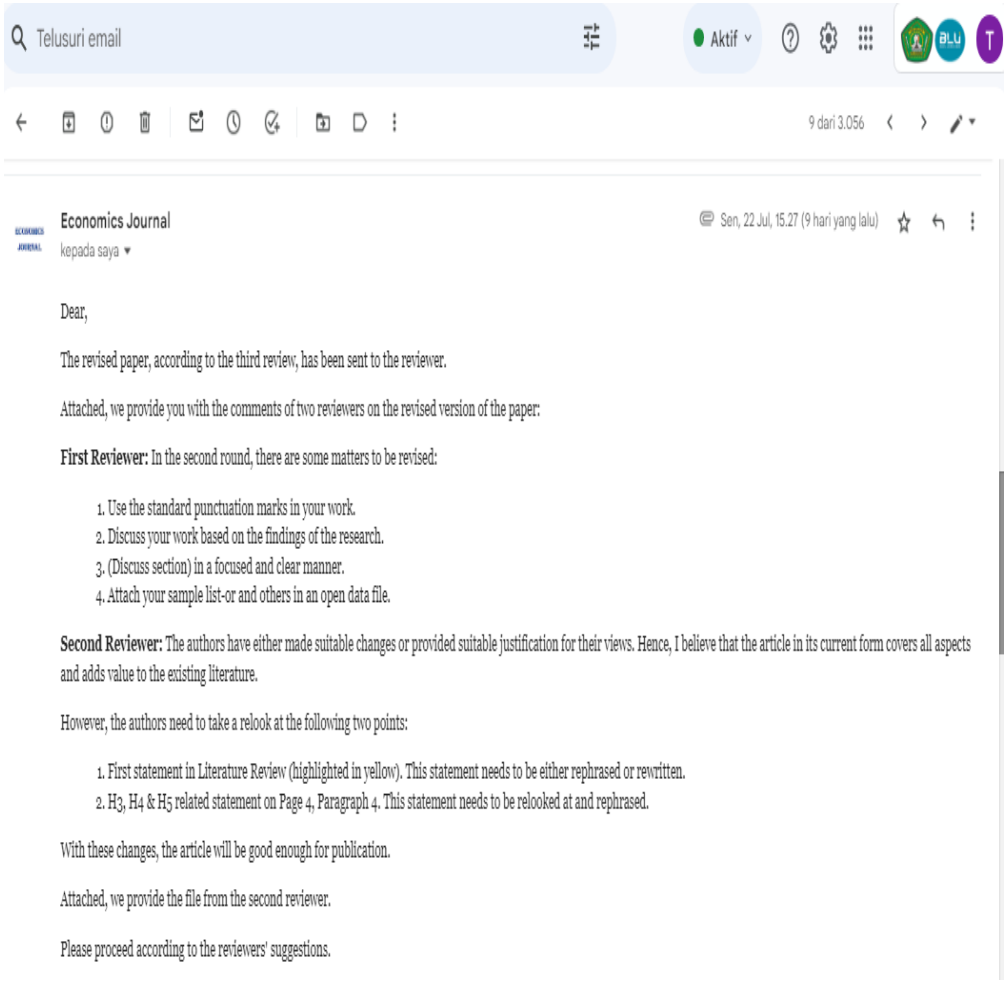


Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Kronologi 8: Pengiriman koreksi artikel (revisi ketiga) - 20 Juli 2024



Kronologi 9: Tanggapan editor terhadap ketiga revisi (ronde empat) - 22 Juli 2024



Telusuri email

Aktif

9 dari 3.056

Economics Journal

kepada saya

Sen, 22 Jul, 15.27 (9 hari yang lalu)

Dear,

The revised paper, according to the third review, has been sent to the reviewer.

Attached, we provide you with the comments of two reviewers on the revised version of the paper:

First Reviewer: In the second round, there are some matters to be revised:

1. Use the standard punctuation marks in your work.
2. Discuss your work based on the findings of the research.
3. (Discuss section) in a focused and clear manner.
4. Attach your sample list-or and others in an open data file.

Second Reviewer: The authors have either made suitable changes or provided suitable justification for their views. Hence, I believe that the article in its current form covers all aspects and adds value to the existing literature.

However, the authors need to take a relook at the following two points:

1. First statement in Literature Review (highlighted in yellow). This statement needs to be either rephrased or rewritten.
2. H_3, H_4 & H_5 related statement on Page 4, Paragraph 4. This statement needs to be relooked at and rephrased.

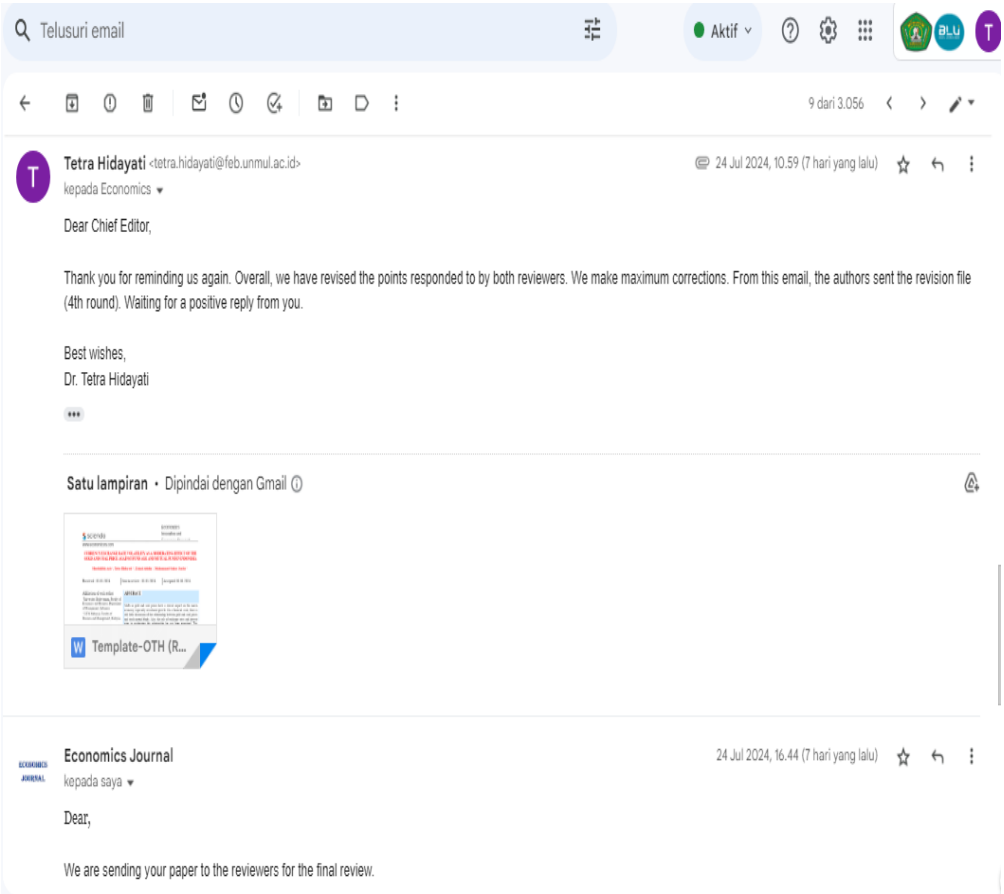
With these changes, the article will be good enough for publication.

Attached, we provide the file from the second reviewer.

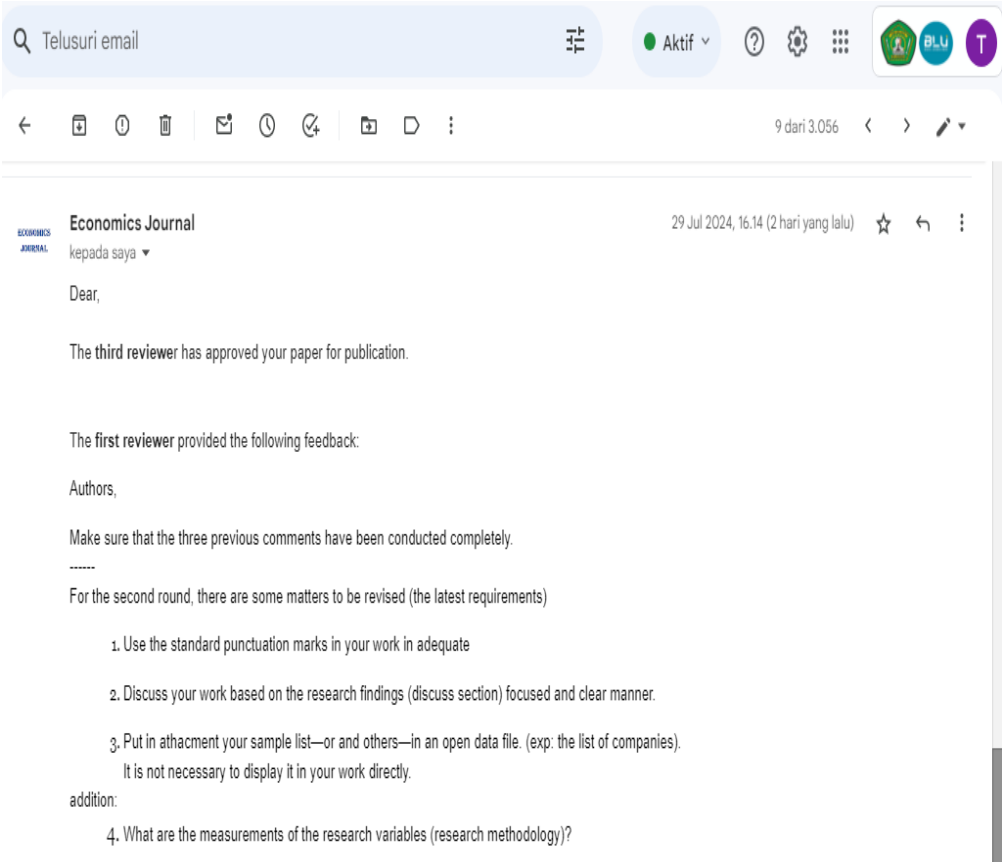
Please proceed according to the reviewers' suggestions.

Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Kronologi 10: Respon penulis lewat revisi lanjutan (revisi keempat) - 24 Juli 2024



Kronologi 11: Komentar editor terhadap perbaikan lanjutan (ronde lima) - 29 Juli 2024



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Aktif

9 dari 3.056

Economics Journal 29 Jul 2024, 16.14 (2 hari yang lalu)

kepada saya

Dear,

The **third reviewe**r has approved your paper for publication.

The **first reviewer** provided the following feedback:

Authors,

Make sure that the three previous comments have been conducted completely.

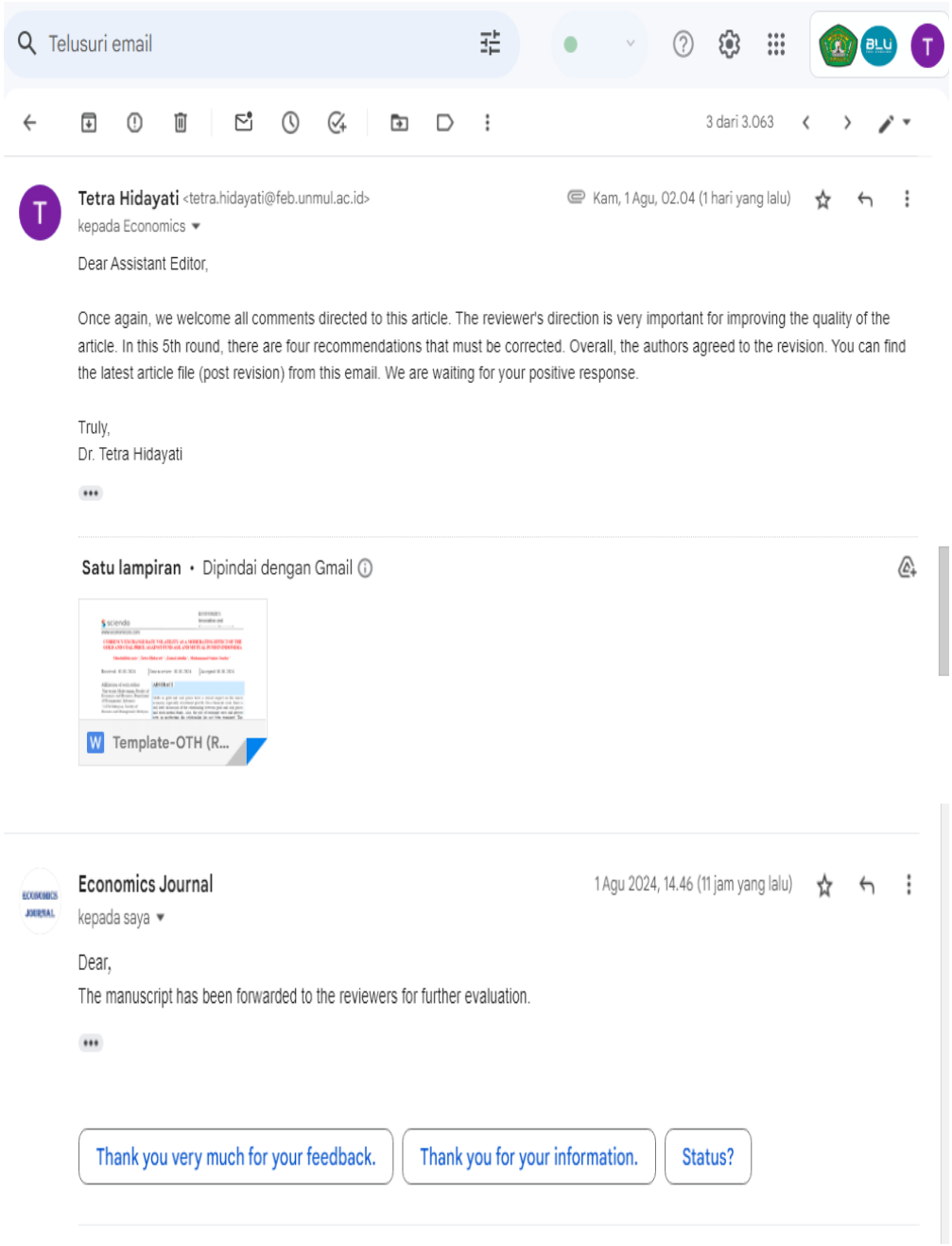
For the second round, there are some matters to be revised (the latest requirements)

1. Use the standard punctuation marks in your work in adequate
2. Discuss your work based on the research findings (discuss section) focused and clear manner.
3. Put in athacment your sample list—or and others—in an open data file. (exp: the list of companies).
   It is not necessary to display it in your work directly.

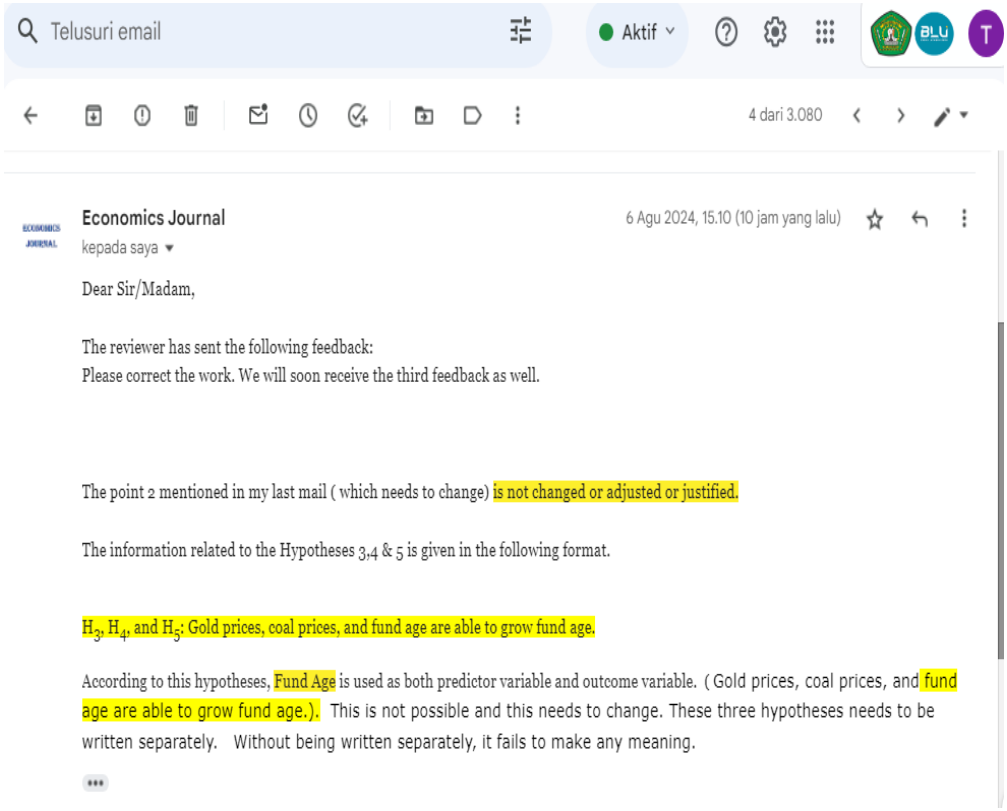
addition:

4. What are the measurements of the research variables (research methodology)?

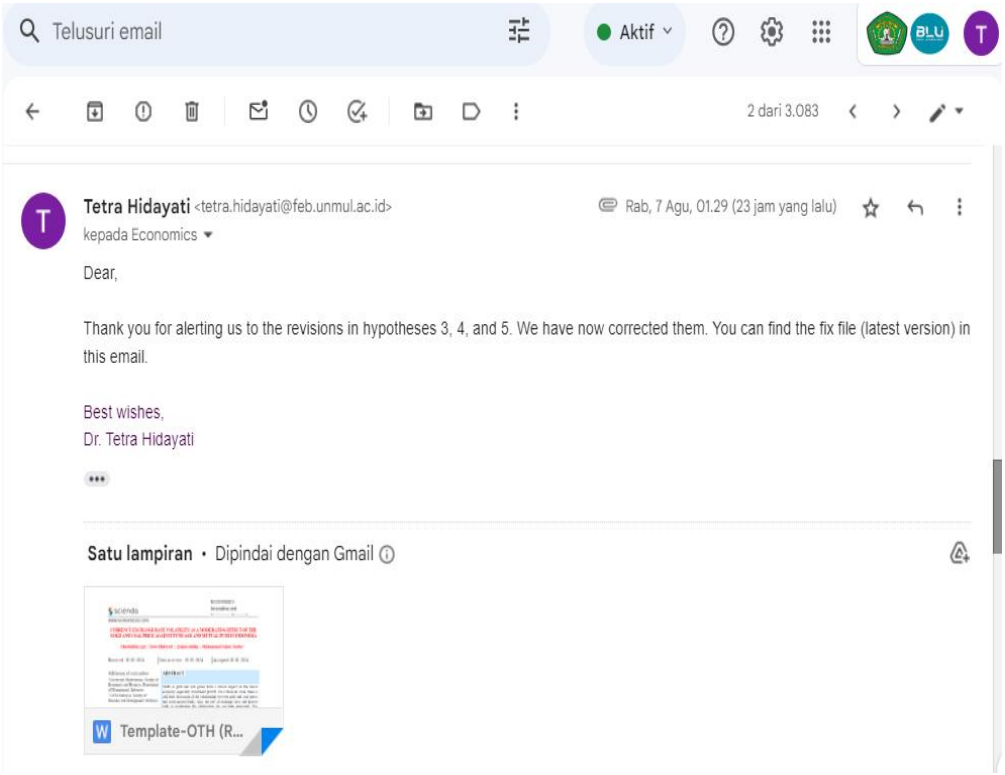
Kronologi 12: Pelampiran kembali atas revisi dari penulis & verifikasi editorial (revisi kelima) - 01 Agustus 2024



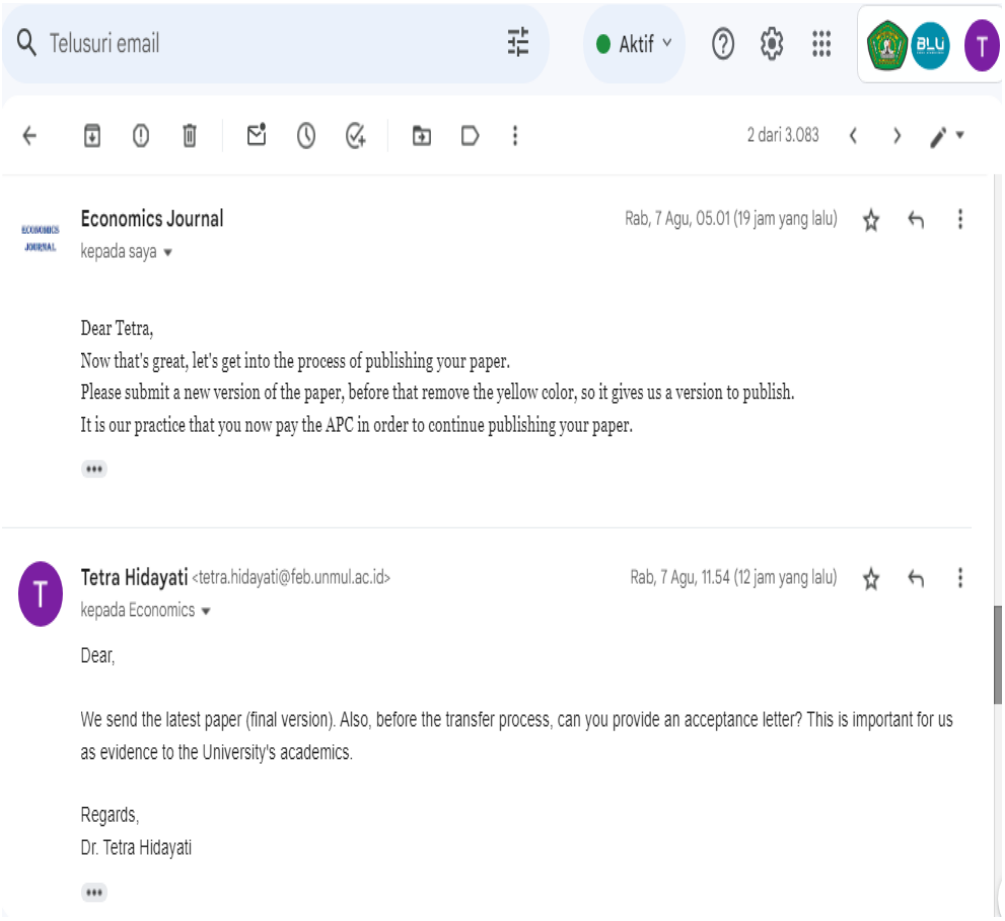
Kronologi 13: Rekomendasi seputar koreksi editorial (ronde enam) - 06 Agustus 2024



Kronologi 14: Penyempurnaan koreksi akhir oleh penulis (revisi keenam) - 07 Agustus 2024

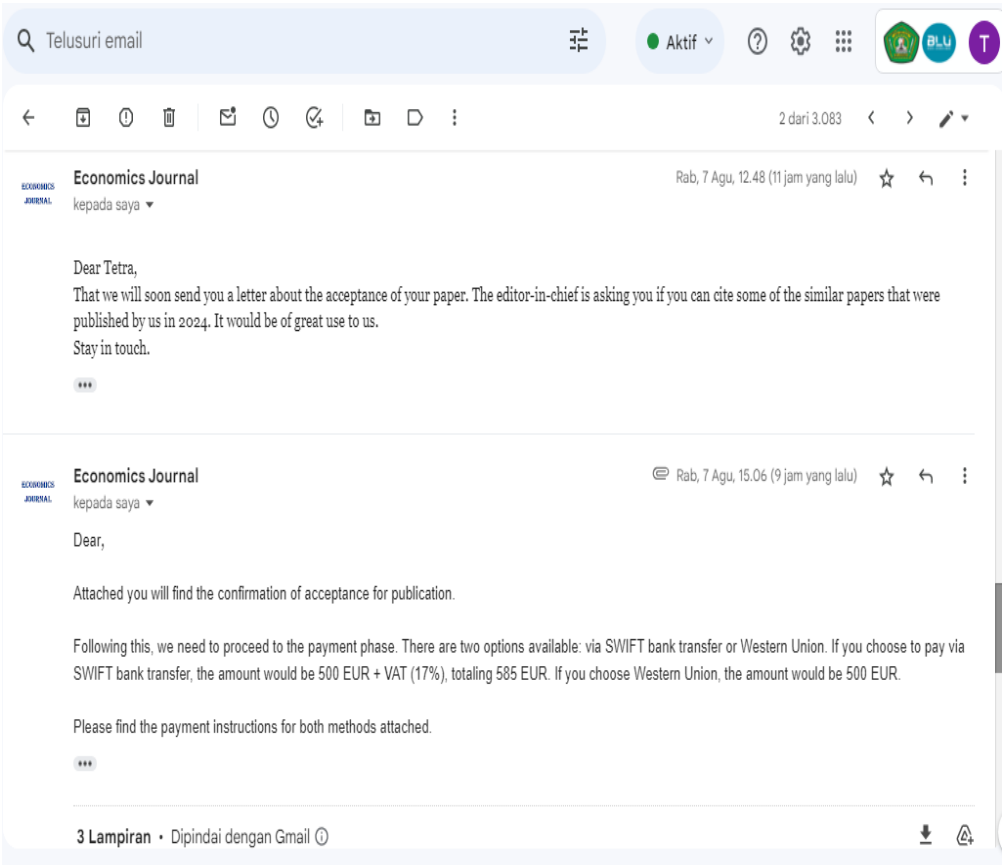


Kronologi 15: Penyuntingan & pengumuman status artikel (*accepted*) - 07 Agustus 2024



Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Kronologi 16: Pemberitahuan pembayaran artikel - 07 Agustus 2024



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2 dari 3.083

Economics Journal
kepada saya

Rab, 7 Agu, 12.48 (11 jam yang lalu)

Dear Tetra,
That we will soon send you a letter about the acceptance of your paper. The editor-in-chief is asking you if you can cite some of the similar papers that were published by us in 2024. It would be of great use to us.
Stay in touch.

Economics Journal
kepada saya

Rab, 7 Agu, 15.06 (9 jam yang lalu)

Dear,

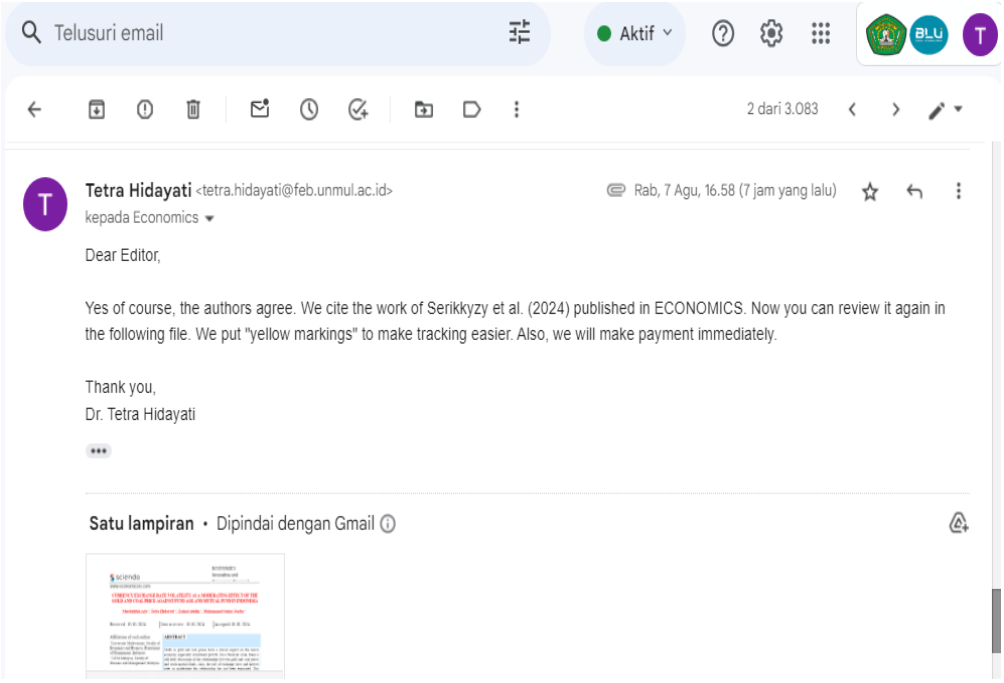
Attached you will find the confirmation of acceptance for publication.

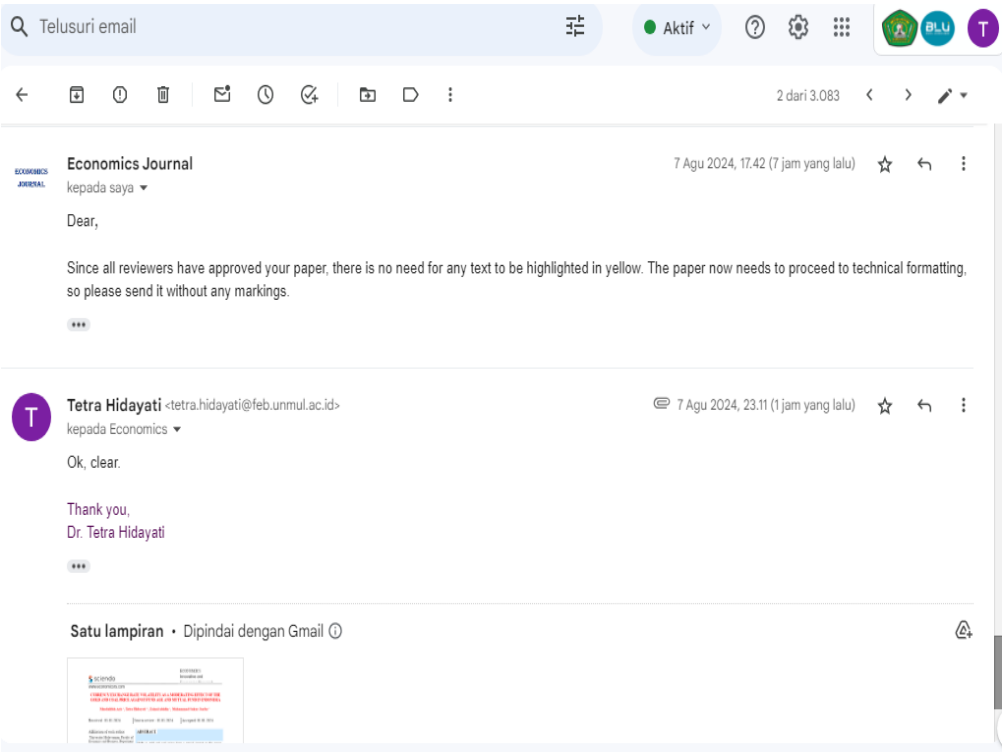
Following this, we need to proceed to the payment phase. There are two options available: via SWIFT bank transfer or Western Union. If you choose to pay via SWIFT bank transfer, the amount would be 500 EUR + VAT (17%), totaling 585 EUR. If you choose Western Union, the amount would be 500 EUR.

Please find the payment instructions for both methods attached.

3 Lampiran • Dipindai dengan Gmail

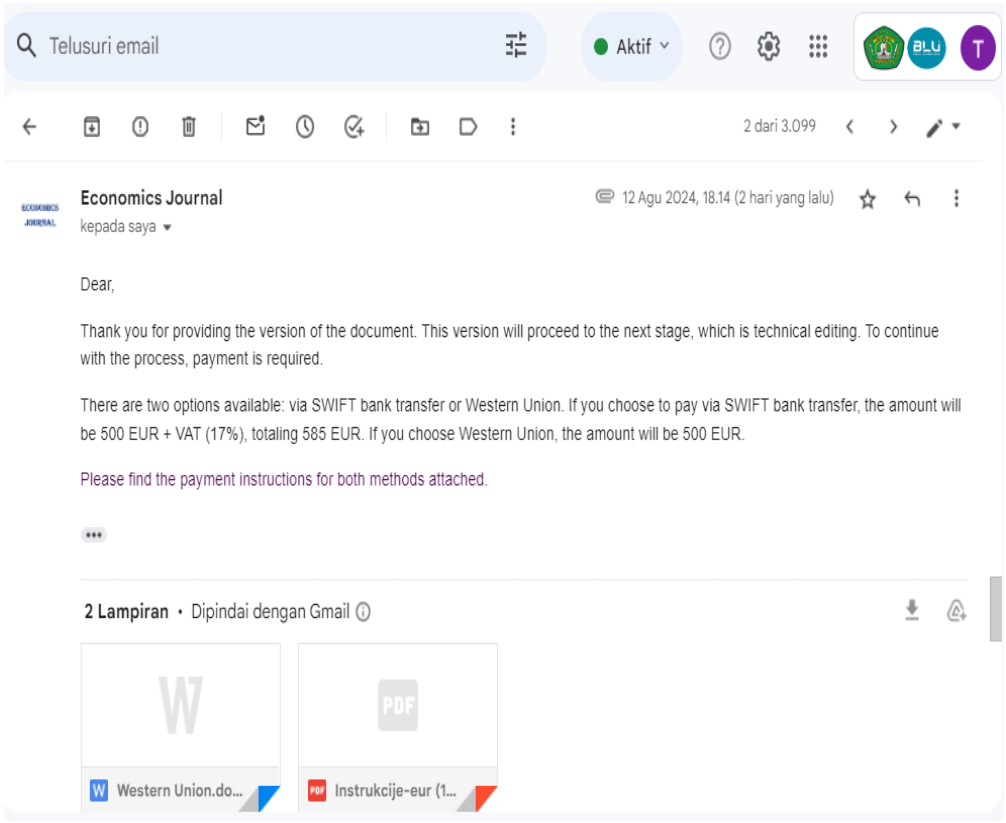
Kronologi 17: Pelaporan artikel versi akhir (pasca *editing*) & balasan editor - 07 Agustus 2024



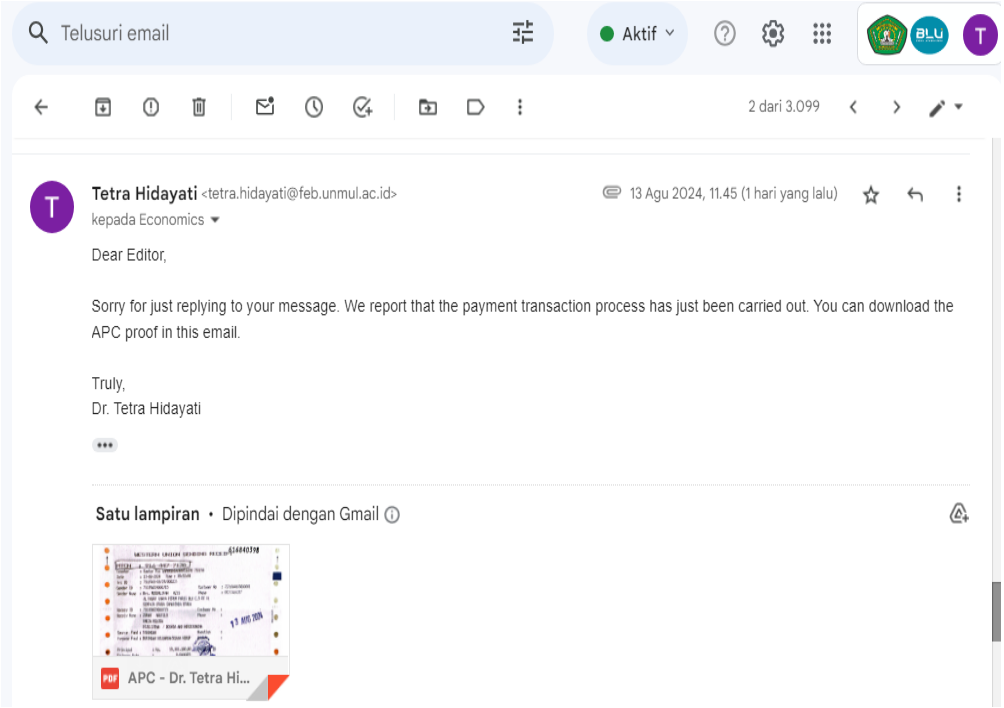


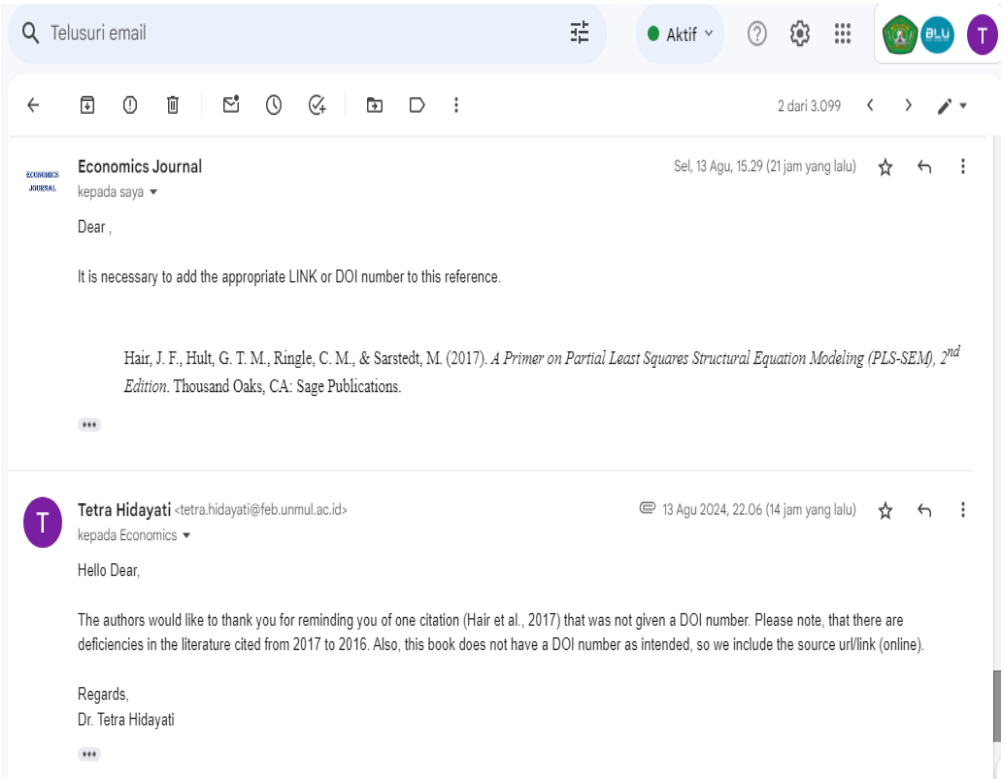
Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Kronologi 18: Notifikasi teknis pembayaran artikel - 12 Agustus 2024



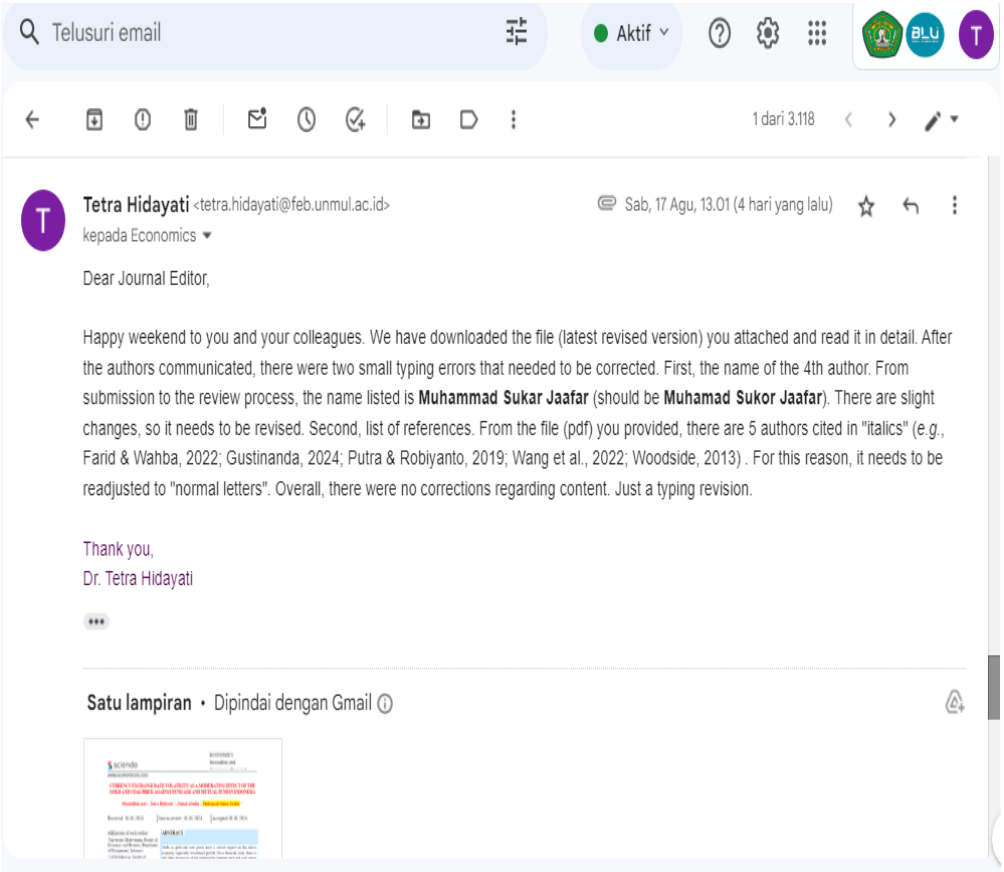
Kronologi 19: Penginformasian transaksi pembayaran - 13 Agustus 2024



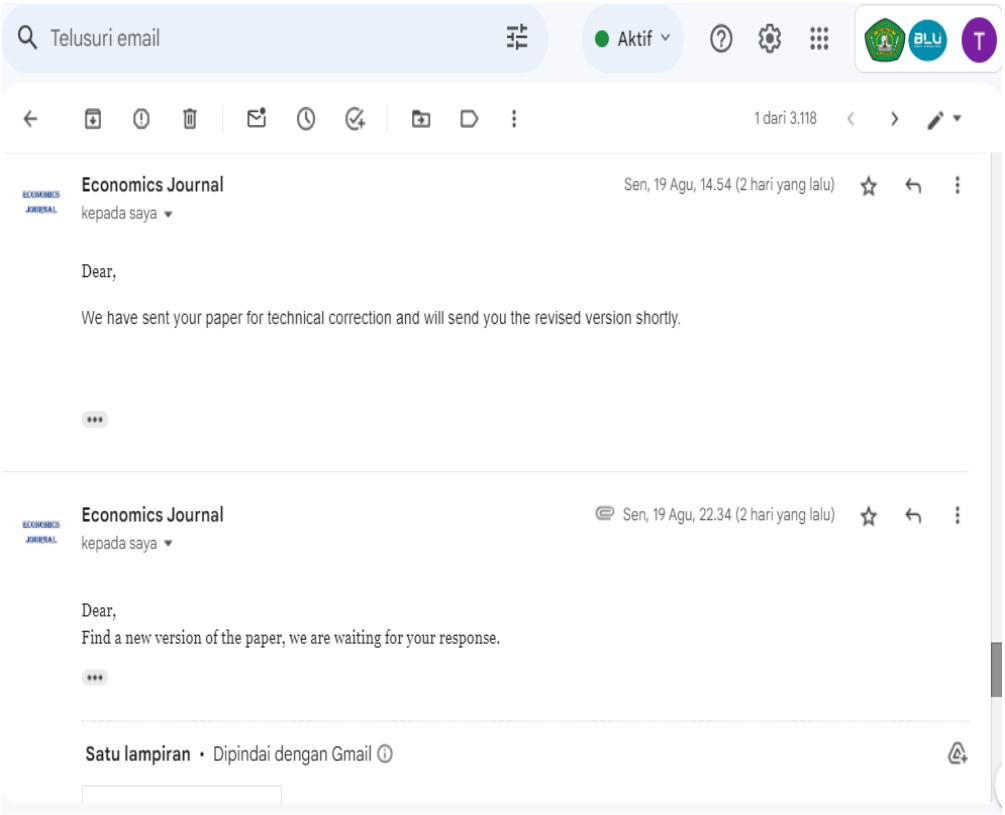


Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Kronologi 20: Justifikasi rincian kepengarangan & koreksi referensi - 17 Agustus 2024

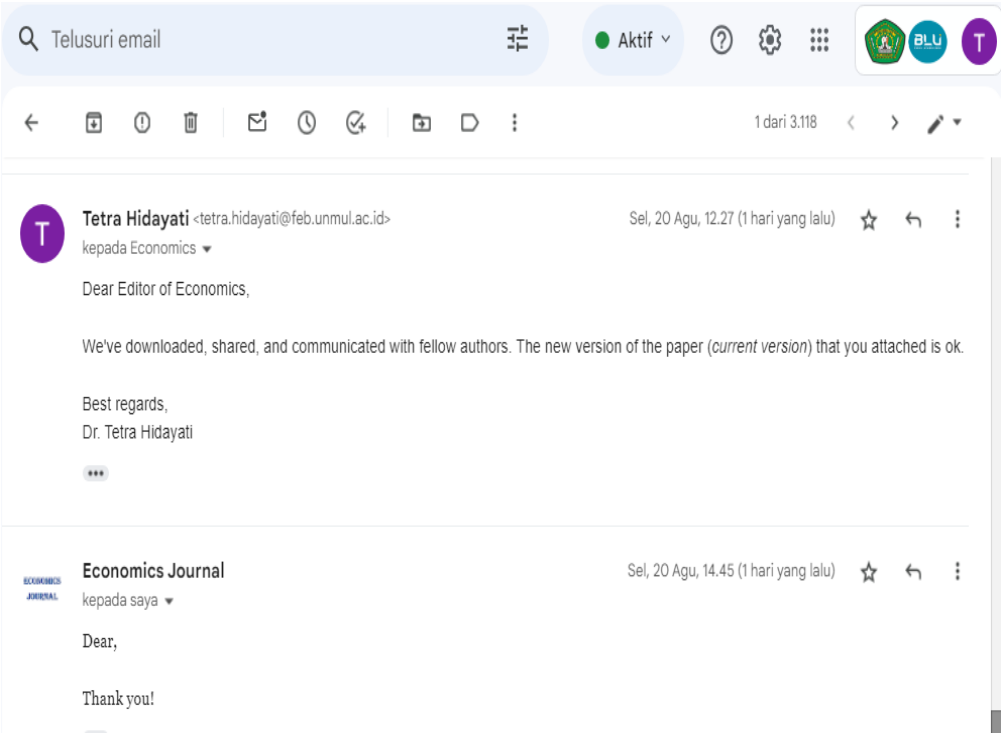


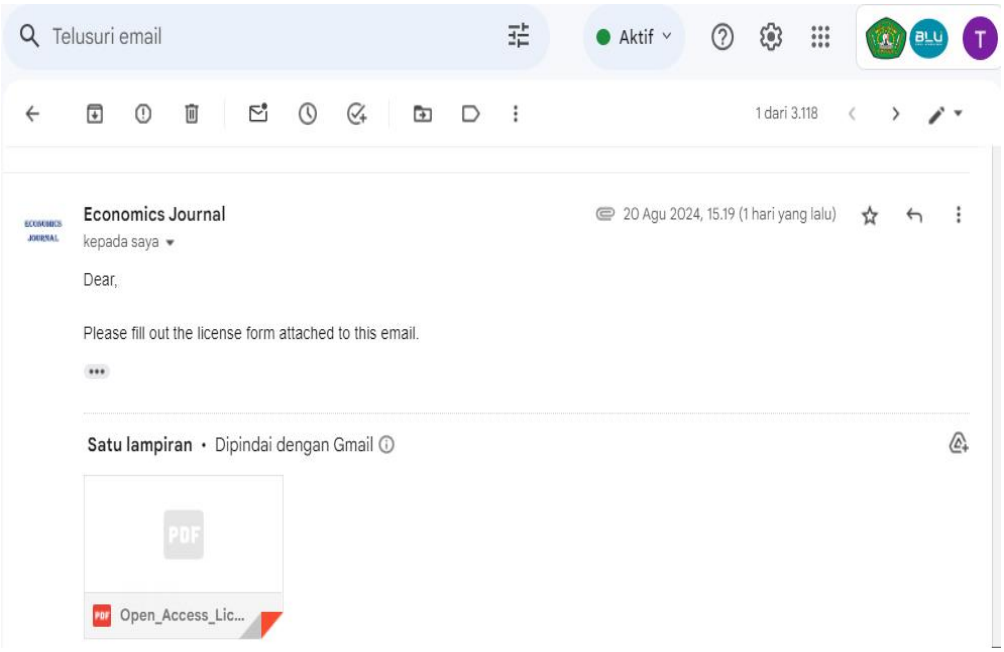
Kronologi 21: Proses produksi artikel - 19 Agustus 2024

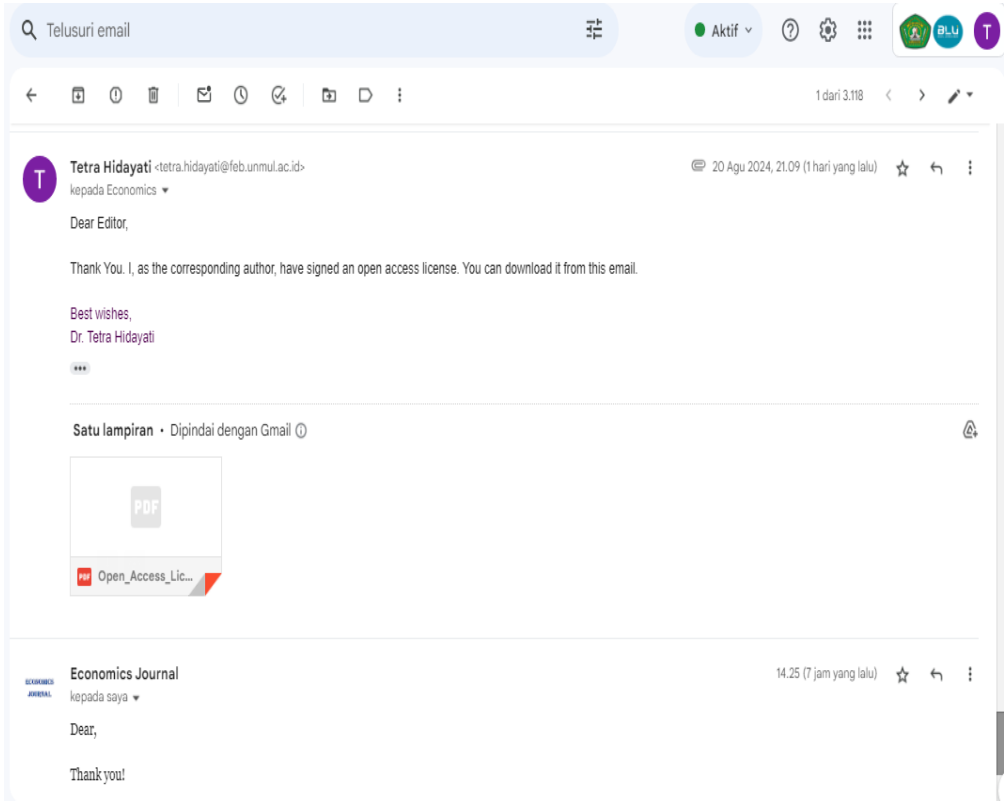


Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Kronologi 22: Pemutakhiran artikel (pra-cetak) & penandatanganan *open access lisence* – 20 Agustus 2024



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Tetra Hidayati <tetra.hidayati@feb.unmul.ac.id>
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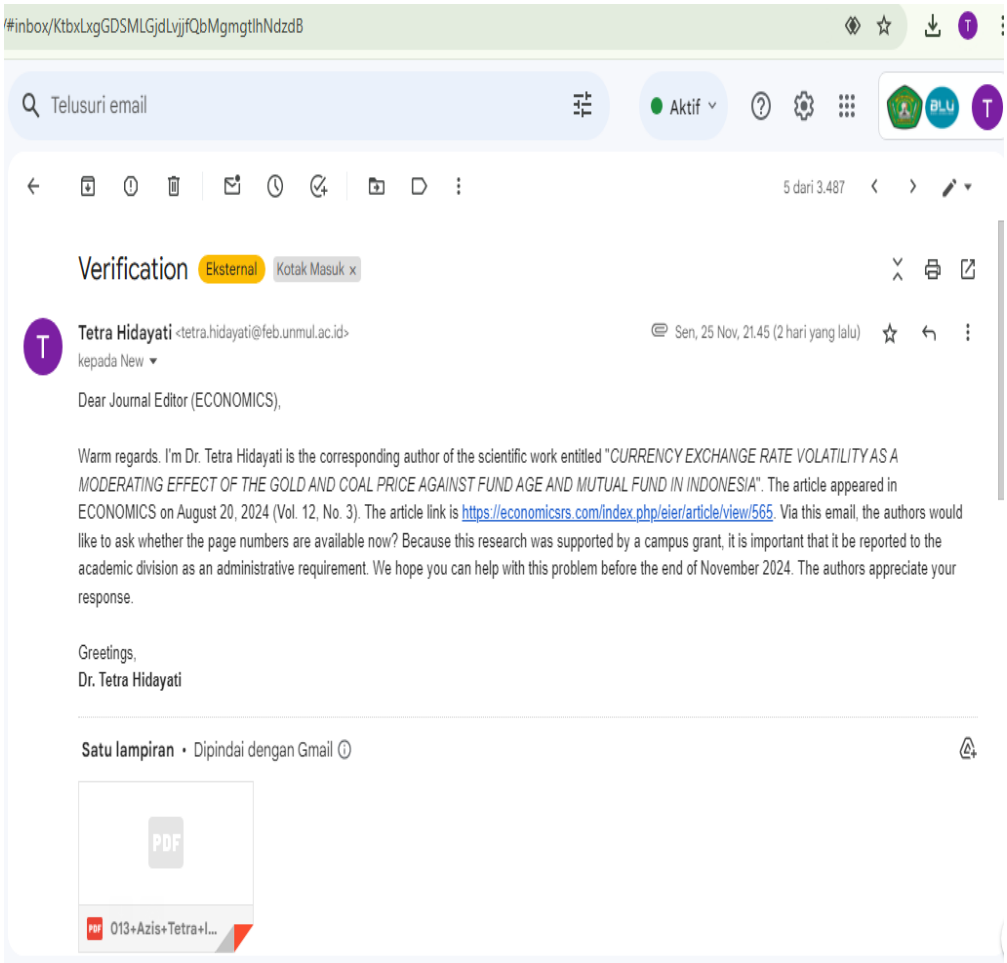

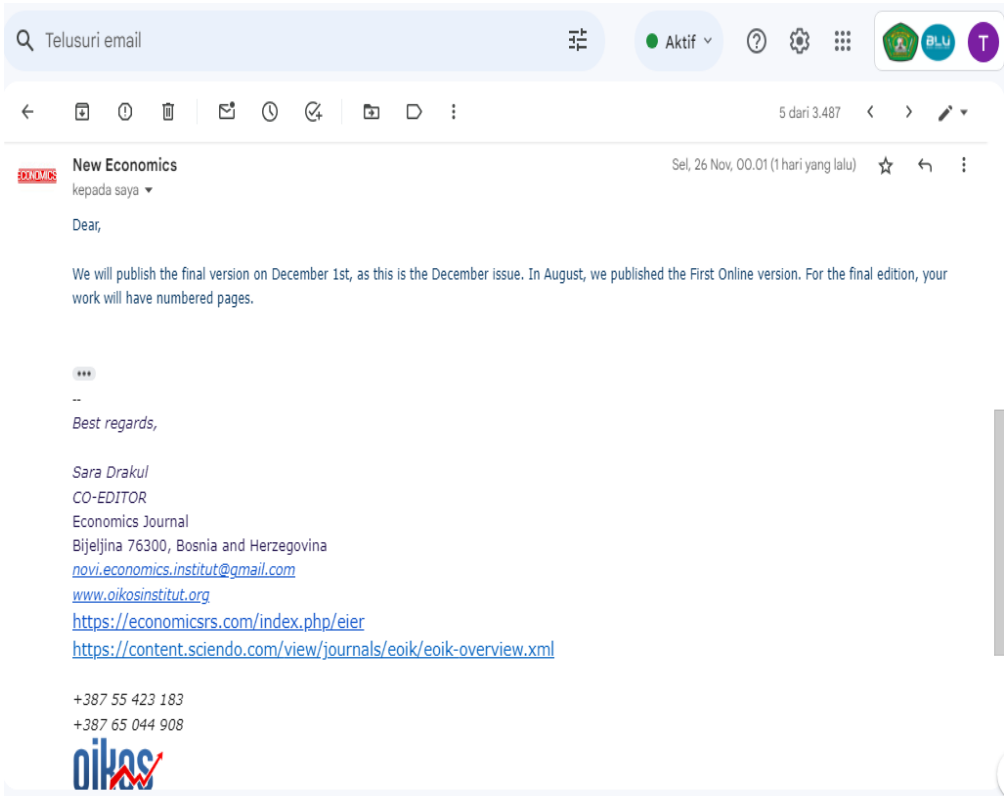

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Best regards,

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Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

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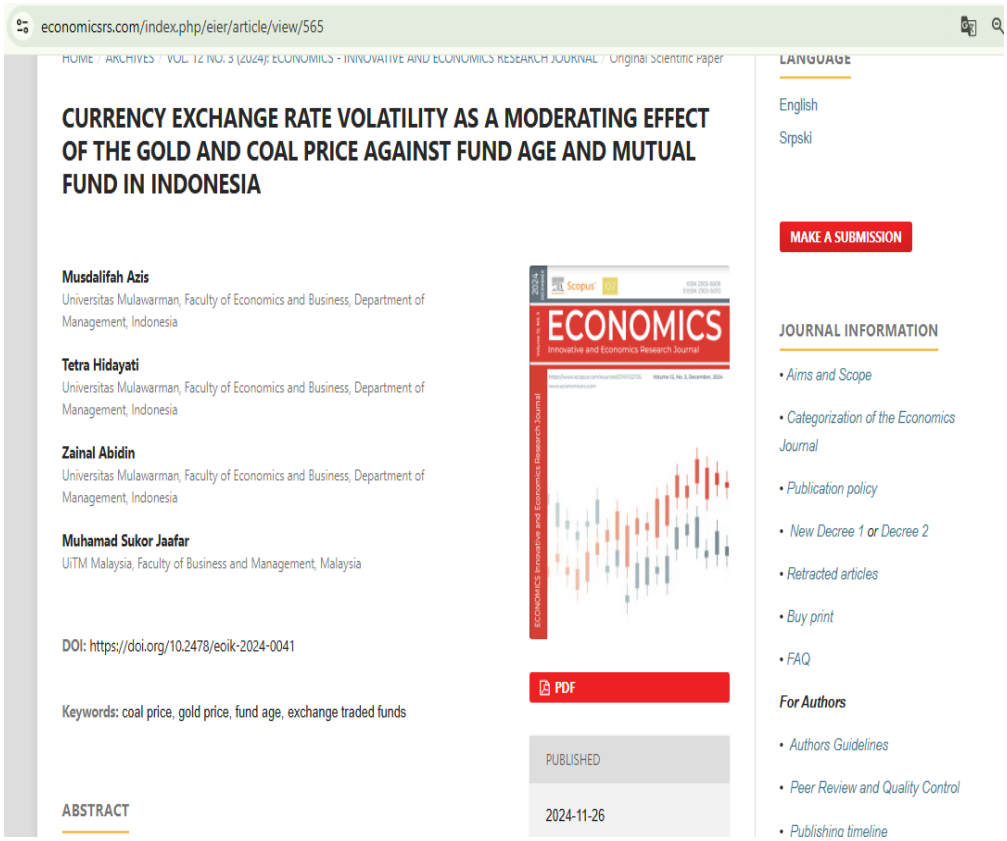

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CURRENCY EXCHANGE RATE VOLATILITY AS A MODERATING EFFECT OF THE GOLD AND COAL PRICE AGAINST FUND AGE AND MUTUAL FUND IN INDONESIA

Musdalifah Azis
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Keywords: coal price, gold price, fund age, exchange traded funds

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ABSTRACT

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- Categorization of the Economics Journal
- Publication policy
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For Authors
- Authors Guidelines
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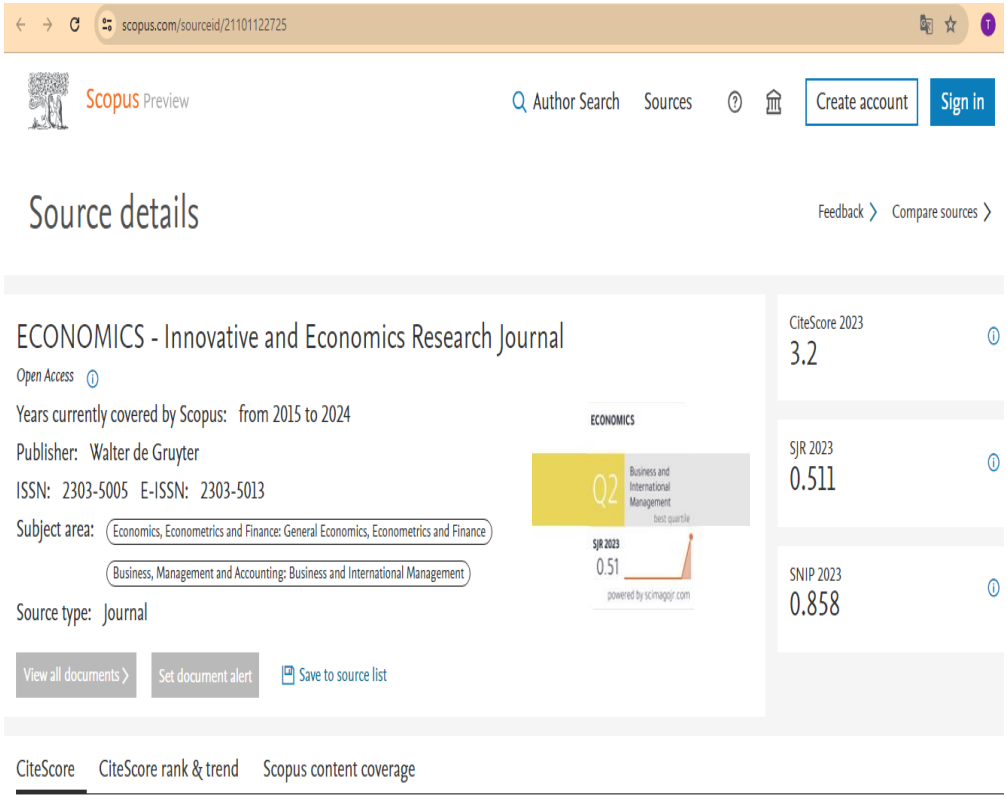
Indeks Jurnal[***]



Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Masukan dari 3 Pengulas[****]

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REVIEW FORM

PART I

Article Title: **Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia**
Reviewer's Name: (The reviewers' identities remain anonymous to author/s)

PART II

Evaluation (Please assign the score for each item below)	
5=Excellent 4=Good 3=Average 2=Below Average 1=Poor n/a=Not Applicable	
Items	**Grade**
Overall evaluation on the paper	
1. Contribution to existing knowledge	3
2. Novel ideas/concepts/techniques	2
3. Complete and accurate figures and tables	3
4. Appropriate formatting and structure	2
5. Readability	2
6. Correct analysis	2

7. Soundness of methodology	3
8. Evidence supports conclusion	1
9. Adequacy of literature review	2
10. Clear, concise and interesting writing	1

❖ **Summary**

This paper needs major revision

❖ **Strengths**

❖ **Weaknesses**

❖ **Suggestions to Author/s**

Dear Author,

This manuscript needs to be revised in a comprehensive manner or major revision required.

1. Abstract not provide research problem and objective, the mainly significant, there is a poor of linking between the title and abstract body.

2. In the introduction: research design is not clear, no data is presented, the phenomenon does not appear, there is no insight and plan to the problem-solving effort, research problems, research objective, and benefits will be strong enough.

3. In literature review: The study does not use current and update literature review, includes is not in accordance with the variables research. This paper should built the hypothesis development to make the empirical position clearly

4.The methodology suggest to use the other tools as this research employed the secondary data and quantitative research

5. From the overall findings, there is no specific argument explaining the novelty of the research.

6. The conclusion does not provide summary of main finding, implication and contribution.

PART III

Recommend the appropriate section for this paper (Please mark "X" for appropriate option)

(X) ORIGINAL ARTICLE
( ) REVIEW ARTICLE
( ) CASE REPORT
( ) SHORT COMMUNICATION

PART IV

Recommendation to Editor (Please mark "X" for appropriate option)
( ) Excellent, accept the submission (3)
( ) Good, accept the submission with minor revisions required (2)
( ) Acceptable, revisions required (2)
( ) Resubmit for review, major revisions required (1)
( ) Decline the submission (1)

APPENDIX

Ethical Guidelines for Reviewers

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- Be aware of potential conflicts of interest (financial, institutional, collaborative, or other relationships between the reviewer and author) and be willing to alert the editor to these, even if it means withdrawing themselves from reviewing a manuscript.
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PART II

Evaluation (Please assign the score for each item below)	
5=Excellent 4=Good 3=Average 2=Below Average 1=Poor n/a=Not Applicable	
Items	**Grade**
Overall evaluation on the paper	
1. Contribution to existing knowledge	4
2. Novel ideas/concepts/techniques	4
3. Complete and accurate figures and tables	5
4. Appropriate formatting and structure	5
5. Readability	4

6. Correct analysis	5
7. Soundness of methodology	5
8. Evidence supports conclusion	4
9. Adequacy of literature review	3
10. Clear, concise and interesting writing	4

❖ **Summary**

The manuscript provides a good idea about the current situation in Indonesia. The author has used details from 20 companies based on specific inclusion criteria.

❖ **Strengths**

Certainly, the topic is thought provoking and useful. The author has used moderated regression analysis, which is a very useful technique. The findings were explained very clearly.

The abstract is quite focused and the author has followed the correct formatting through out the assignment.

❖ **Weaknesses**

The study covers all the major aspects. However, the following issues needs consideration/ action.

1. The literature review could have touched a bit on how is the relationship between gold/ Coal prices and Fund age and Mutual Funds in other countries who are similar to Indonesia. This would have added more value to the context and improved the importance of this study.
2. Why The author has used Smart PLS to conduct the moderated regression analysis? What is the reason behind choosing this particular software, when more frequently used programmes like AMOS are available. This selection needs to be justified, to make the methodology stronger.
3. There should be literature support to project fund age as a mediator variable. This should be included.
4. There is atleast one VIF value >0.5 (Table A). The implication / non-significance of this needs to be discussed.
5. Good amount of information about the past studies related to the topic, written in the discussion section, should be moved to literature review section. The discussion section, should discuss about the findings of this study, in relation to past studies. This section needs to be either relooked or rephased to improve the value of the manuscript.

❖ **Suggestions to Author/s**

The author needs to take a relook at the discussion section.

PART III

Recommend the appropriate section for this paper (Please mark "X" for appropriate option)
(X) ORIGINAL ARTICLE
( ) REVIEW ARTICLE
( ) CASE REPORT
( ) SHORT COMMUNICATION

PART IV

Recommendation to Editor (Please mark "X" for appropriate option)
(x) Excellent, accept the submission (5)
(x) Good, accept the submission with minor revisions required (4)
( ) Acceptable, revisions required (3)
( ) Resubmit for review, major revisions required (2)
( ) Decline the submission (1)

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- Be vigilant for plagiarized material and/or falsified and/or manipulated data and be willing to alert the editor if this is suspected in a manuscript.

Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

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Review Form

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Reviewer's Name: (The reviewers' identities remain anonymous to author/s)
N.N.

PART II

Evaluation (Please assign the score for each item below)	
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Items	**Grade**
Overall evaluation on the paper	
1. Contribution to existing knowledge	3
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3. Complete and accurate figures and tables	3
4. Appropriate formatting and structure	4
5. Readability	4
6. Correct analysis	3
7. Soundness of methodology	4
8. Evidence supports conclusion	3
9. Adequacy of literature review	3
10. Clear, concise and interesting writing	3

❖ **Summary**

This study examines the performance of Indonesian stock mutual funds in relation to the moderating effects of gold, coal, and fund-aged exchange-traded funds (ETFs) on interest rate and exchange rate volatility. Core data was obtained from 51 companies as mutual fund owners officially registered with the Financial Services Authority (OJK) throughout 2019–2022. By operating Moderated Regression Analysis (MRA) into SmartPLS 4, there are interactions between prices and currency rates, prices and interest rates, and prices and gold prices.

❖ **Strengths**

Studies relating to Indonesian stock mutual funds on interest rate and exchange rate volatility have been widely highlighted. What makes this study different from others is that it concentrates on data from 51 companies officially registered with the Financial Services Authority (OJK) Indonesia, using short-term methods and data. The use of multiple statistical methods provides a robust framework for analyzing the data, allowing for a nuanced understanding of the relationships between the key variables. Then, the presentation of the analysis is reviewed interestingly and supported with various past studies in the discussion section.

❖ Weaknesses
Presentation of abstract should be improved. This study does not include policy implications, limitations and future research of the study.
❖ Suggestions to Author/s
Abstract: Please give a brief introduction and problem statement before study objective. Please also include policy implication after findings. Conclusion: It will be helpful to discuss the implication to policy makers (government). The authors should include limitations and future research of the study.

PART III

Recommend the appropriate section for this paper (Please mark "X" for appropriate option)
(x) Original Article
( ) Review Article
( ) Case Report
( ) Short Communication

PART IV

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() Acceptable, revisions required (3)
( ) Resubmit for review, major revisions required (2)
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Appendix

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- Be vigilant for plagiarized material and/or falsified and/or manipulated data and be willing to alert the editor if this is suspected in a manuscript.

Currency Exchange Rate Volatility as a Moderating Effect of the Gold and Coal Price against Fund Age and Mutual Fund in Indonesia

Letter of Acceptance **(LoA) & Slip APC**[*****]

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No. 157/24
Date: 7th August 2024

Tetra Hidayati
Universitas Mulawarman, Faculty of Economics and Business, Department of Management, Indonesia

CONFIRMATION

We hereby confirm that the paper authored by Tetra Hidayati titled " CURRENCY EXCHANGE RATE VOLATILITY AS A MODERATING EFFECT OF THE GOLD AND COAL PRICE AGAINST FUND AGE AND MUTUAL FUND IN INDONESIA" has undergone blind peer review by three anonymous reviewers and received positive evaluations. Based on these assessments, the Editor-in-Chief of ECONOMICS – Innovative and Economics Research Journal www.economicsrs.com has accepted the paper for publication. It has been decided that the paper will be published in the upcoming December 2024 issue of the journal, which is indexed in Scopus Q2. For further details, you may refer to the journal's profile on Scopus at https://www.scopus.com/sourceid/21101122725 ISSN: 2303-5005 E-ISSN: 2303-5013

This confirmation is issued at the request of the author and is intended solely for academic purposes.

For the publisher
Editor-in-Chief
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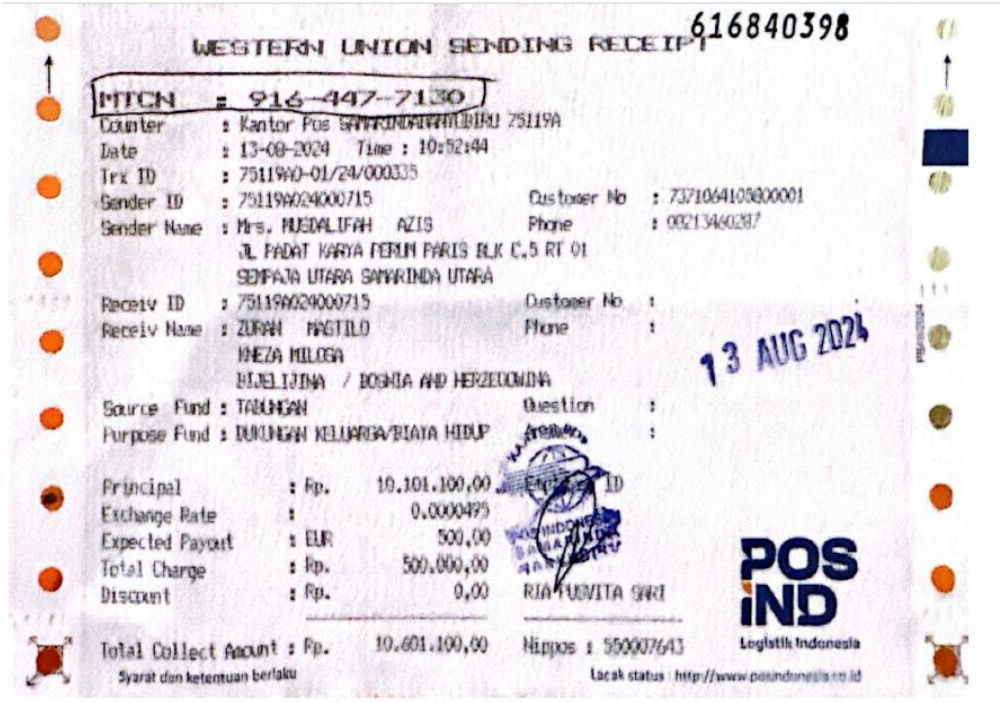

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CURRENCY EXCHANGE RATE VOLATILITY AS A MODERATING EFFECT OF THE GOLD AND COAL PRICE AGAINST FUND AGE AND MUTUAL FUND IN INDONESIA

Musdalifah Azis [1], Tetra Hidayati [1*], Zainal Abidin [1], Muhammad Sukar Jaafar [2]

Received : 01.01.2024. | Sent to review : 01.01.2024. | Accepted: 01.01.2024.

Affiliation of each author

[1] Universitas Mulawarman, Faculty of Economics and Business, Department of Management, Indonesia

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JEL classification
Q41; G32; B17

ABSTRACT

On a financial scale, there is still little discussion of the relationship between gold and coal prices and stock mutual funds. Also, the role of exchange rates and interest rates in moderating this relationship has not been examined. This research reviews the performance of exchange-traded funds (ETFs) in the scope of fund age and Indonesian stock mutual funds which are influenced by gold and coal prices with the moderating effect of interest rates and exchange rates. Core data was obtained from 51 companies as mutual fund owners officially registered with the Financial Services Authority (OJK) throughout 2019–2022. By operating Moderated Regression Analysis (MRA) into SmartPLS 4, there are interactions between prices and exchange rates, prices and interest rates, and prices and gold prices. As with the relationship between the age of ETF mutual funds traded on the Indonesian Stock Exchange (IDX) and the gold price, these two variables have a strong and positive correlation. This implies that relatively small changes in gold prices over the monitoring period may impact the fund age ETF. This positive association shows that an ETF investment can have its life extended by a relatively small increase in gold prices. This research indicates a strong causality, which improves the ETF's performance on the IDX as fund age rises. Furthermore, the second model examines how fund age, gold, and coal have a direct impact on ETF mutual fund performance. It also looks closely at how indirectly coal, gold, and fund age affect ETF performance. The age of the fund, gold, coal, and exchange rates affect the performance of ETFs. While the effect is not statistically significant, interest rates, gold, coal, and fund age have a beneficial impact on ETF performance.

Keywords: *coal price; gold price; fund age; exchange traded funds*

Comment [i-[1]: Abstract not provide researc problem and objective, the mainly significant, the is a poor of linking between the title and abstract body. **Reply:** The problem and research objective are explained at the beginning of the abstract secti Also, the link between the title and the content of abstract has been adjusted correctly.

1. INTRODUCTION

Several nations have had challenges substituting coal with alternative energy sources in specific sectors, primarily because of its cost-effectiveness. The elasticity of coal prices increased due to the conflict between Russian with Ukraine, the leading coal producer, which restricted coal exports to other nations (van Meijl et al., 2024; Wang et al., 2022; Yagi & Managi, 2023). Coal is increasingly emerging as a significant global energy source, and fluctuations in coal prices have significantly influenced the profitability of businesses in this sector (Azis et al., 2020; Hassan et al., 2024). A robust model for forecasting coal price indices can serve as an effective tool for firms that rely on coal consumption, enabling them to optimize their coal purchase plans and contribute to the reduction of global carbon emissions. The ETF-energy portfolio can integrate this model as a performance instrument. In certain countries, the rising interest in gold investment due to fluctuations in gold prices

Comment [i-[2]: In the introduction: research design is not clear, no data is presented, the phenomenon does not appear, there is no insight a plan to the problem-solving effort, research problems, research objective, and benefits will be strong enough. **Reply:** The introduction has been modified with a clear design, including including data at the beginning and bringing up factual phenomena to strengthen insights. In addition, the problems, objectives, and benefits of research are specifically described as motivation in building theoretical knowledge and practical policies.

has led to a considerable shift from random investments to gold investments as a means of generating higher revenue.

The central bank, which controls monetary policy to maintain currency stability, is now observing a decline in interest rates and exchange rates versus the US dollar (USD). Macroeconomic factors, such as changes in interest rates and exchange rates can influence the value of the depository's fund, which in turn affects the performance of these depositories (Gerlach et al., 2018; Keshtgar et al., 2020; Kurniawan & Prajanti, 2017; Purwono et al., 2020).

Indonesia is a developing market that is famous for its wealth of mineral resources (Ascher, 2012; Hajad et al., 2023). Domestic mineral resources that can be found include oil, gold, gas and coal. Ekananda (2022) describes that the majority of macroeconomics in Indonesia rely on natural resource products which contribute to the growth of Gross Domestic Product (GDP). Primary mineral commodity trading aims to gain profits from mineral exchanges that encourage economic growth through Balance of Trade (BOT). Indonesia's energy needs are determined by the mining sector which plays a fairly large role with a contribution of 12.22% to GDP in 2022 (BPS-Statistics Indonesia, 2024).

In general, An et al. (2020), Fajarini & Darmawan (2024), Melas & Michail (2024), Putra & Robiyanto (2019), Soelistijo et al. (2015), and Zhu et al. (2023) revealed that mineral commodities have an impact on stock prices. To our knowledge, no study has explored the influence of currency exchange rate moderation on the correlation between global coal prices and the fund age ETF Reksadana shares. The goal of this project is to close these gaps. The study's design incorporated the subsequent primary research inquiries: (1) Examined the effects of various factors, including coal price, gold price, exchange rate, and interest rate interaction, exchange rate and gold price interaction, exchange rate interaction with coal rate, and the interaction of exchange rate and gold price, on the performance of fund age ETFs traded on the IDX; and (2) Explores the immediate impact of coal price, gold price, and fund age on the ETF group's performance. The findings also examined the indirect relationships between coal and gold prices, taking into account the impact of the fund's age on an ETF's performance. Furthermore, it investigated the effect of exchange value interactions on coal and gold prices, as well as the fund's age. It also examined the impact of interest rate interactions on coal and gold prices, as well as the fund's age, on the ETF's performance.

The initial and subsequent models analyze the influence of coal and gold prices on the assets of the Indonesian nation, necessitating proficient administration to attract investors in particular industries. The government uses interest rate and exchange value as a policy tool to maintain macroeconomic stability, especially in specific industries (Li et al., 2021). This paper identifies the relationship between interest rate and coal interaction and price, interest rate and gold interaction, exchange value and price of coal, interaction of exchange values, and gold price with fund age ETFs traded on the IDX. Investors may gain confidence when they observe a fund's age of investment increasing, since they interpret this as an indication of a higher investment value (Bai et al., 2019; Joshi & Sebastian, 2022; Nguyen et al., 2018; Saleem et al., 2021).

By looking at the above phenomenon, the current study is designed to identify the impact of two essential commodity prices in the world, *i.e* gold and coal on fund age and mutual funds which are bridging by exchange rates and interest rates. The insights in this new study are focused not only on linking gold prices and coal prices to fund age and mutual funds, but are also varied by including the role of exchange rates and tribes in the relationship between the two commodities to push fund age and mutual funds in a positive direction. The benefits of the analysis output make it possible to solve problems in the future, which makes it easier for investors to plan buying and selling transactions for ETF products in the hope of getting convenience, transparent information, diversification, affordable capital and liquidity. Also,

the usefulness of the study is a consideration for banks in determining interest rates to stimulate exchange rate stability.

2. LITERATURE REVIEW

The investment management selected stocks to optimize the value of the ETF portfolio. The volatility of coal prices affects the worth of the retailer's portfolio by controlling their performance, which is influenced by the movement of coal prices. Due to the calm movement of exchange rates, the massive Russian invasion of Ukraine triggered a dynamic movement in commodity prices (Chen et al., 2023; Maurya et al., 2023). Investors expect fund age, a key measure of factors influencing ETF performance to assist in developing more efficient ETF portfolios and to assist fund providers in enhancing the quality of their offerings (Tripathi & Sethi, 2022). Kasongwa & Minja (2022) explains that the influence of interest rate and exchange value interactions on coal and gold prices moderately improves ETF market performance. Differences in size and volume between ETFs and their underlying portfolios, based on fund age and pricing errors, explain ETF performance gaps, which fundamentally vary cross-sectionally over time (Pham et al., 2021).

The movement of exchange rate interactions at fund age influences the gaps in the performance of ETFs. An increase in currency exchange rates indicates their interaction at the volume and size of fund age, thereby minimizing the impact of pricing errors on ETF performance. This is because transactions involving coal and gold between countries require stable exchange rate movements (Setiawanta et al., 2020). Global risk factors, primarily associated with the volatility of coal and gold prices, significantly restrict the ability to independently implement monetary policy through interest rate and exchange rate lines, thereby enhancing the performance of ETF markets and negatively impacting real economic growth (Aloui et al., 2018; Alsubaiei et al., 2024; Sanderson & Lumpkin-Sowers, 2018). The supply and demand of the USD, along with value fluctuations, consistently influence the value of gold. The purchasing power of people, impacted by various conditions or economic conditions, influences the value of the USD and subsequently the price of gold.

In the context of currency exchange rates, a depressed USD relative to other currencies will lead to a surge in demand for US commodities, particularly gold, given their valuation in USD. As a result, the price of gold will rise. When the value of the USD decreases, people in countries with a different currency can buy or invest in US gold at a lower price. This is due to the fact that the value of gold in USD decreases, thereby making it more affordable. As a result, individuals with other currencies must pay a higher price to purchase gold from the US, and in some cases, they may not be able to afford to purchase it at all. This decrease in demand for gold has resulted in a fall in its price (Al-Ameer et al., 2018; Arisandhi & Robiyanto, 2022; Betancur-Corredor et al., 2018; Hendro et al., 2020). The price of gold changed as the stock market collapsed (Al-Ameer et al., 2018; Mensi et al., 2013; Padungsaksawasdi, 2020). As a result, gold investors' sentiment in relation to expected gold price movements can flow into the stock market, causing contagious effects. If the gold investor carries the same information as the equity investor, the stock market activity will respond to the change in that gold investor.

The economy is experiencing a persistent appreciation of currency exchange rates, accompanied by substantial volatility over time. Inflation rates, interest rates, political instability, economic performance, and external debt typically determine the volatility of the currency exchange rate, which ultimately affects the number of investors in the stock markets (Ghauri et al., 2024; Hendro et al., 2020; Setiawanta et al., 2020; Zubair & Aladejare, 2017). Indonesia's important role as an exporter of coal bricks has a significant impact on exchange rates. This encourages us to do research on the exchange rate and price of coal in Indonesia

Comment [i-[3]: In literature review: The stu does not use current and update literature review, includes is not in accordance with the variables research. This paper should built the hypothesis development to make the empirical position clear **Reply:** The literature review is updated based on latest empirical findings regarding the variables analyzed, especially adding and upgrading citatio Also, our outline the proposed hypotheses specifically.

(Chandrarin et al., 2022). The reverse correlation between currency exchange rates and coal prices suggests that the Indonesian currency is rising in value relative to the USD. The empirical conclusions we have drawn have important implications for the central bank authorities in their efforts to control the exchange rate by optimizing the value of coal benefits through exchange-rate lines.

Interest rates are among the monetary tools used for economic intervention (Christou et al., 2020; Umoru & Hussaini, 2022). In addition to interest rate swings, stock market performance indicators also have an impact on investors' decisions regarding the performance of the unofficial sector of the market. According to research, interest rates initially have a beneficial impact on investment growth but subsequently start to exert negative pressure on rises in investment.

So far, fund age determined by commodity prices (gold and coal) compared by Akhmadi et al. (2023) and Zufa & Prasetyo (2023). In fact, market timing in gold stocks is crucial to the life of a mutual fund. In essence, gold stocks have a relatively high risk for mutual fund investment. But, increasingly expensive global energy prices such as coal have a significant impact on the Indonesian stock index (Yasri & Anas, 2023). The relevance of commodity prices (gold and coal) and fund age to mutual funds is also tested. In this context, Gwilym et al. (2011) and Shabbir et al. (2020) argue that the specialization of gold prices can provide explanatory power to future stock markets. It can also be understood about the effect of coal prices on mutual funds, where mutual funds in energy equity are triggered by more systemic market movements (Malhotra & Nippani, 2024). Marti-Ballester (2019) stated that the price of conventional energy (including coal) is an integration in mutual fund investment decisions. In short, equity mutual funds still depend on coal trading even though decarbonization movements are being carried out by some companies as an effort to reduce carbon emissions (Rohleder et al., 2022). Moreover, the correlation between fund age and mutual funds is positive. This was revealed by Fajrinda et al. (2022), Hada & Suri (2020), and Rachmayanti et al. (2023) that fund age can improve mutual fund performance.

In the scientific space, the connection in fund age and mutual fund mechanisms formed by trends in gold and coal prices through interest rates and exchange rates has never been analyzed. In fact, interest rates and exchange rates are monetary policies. In principle, this policy is a scheme that can control and at least be an initial parameter for investors in seeing patterns in fund age and mutual funds which at any time can experience shifts according to the dynamics of gold and coal prices. The terminology about the role of interest rates and exchange rates in the role of coal and gold prices on fund age and mutual funds opens up academic and theoretical gaps, making it ideal for follow-up. To develop the position and function of each study variable, study hypotheses that can be built are as follows:

H_1 and H_2: The increase in gold prices and coal prices can increase fund age.H_3, H_4, and H_5: Gold prices, coal prices, and fund age are able to grow fund age.

H_6, H_7, H_8, and H_9: Gold prices and coal prices, which are moderated by interest rates and exchange rates, have an impact on fund age.

H_{10}, H_{11}, H_{12}, H_{13}, H_{14}, and H_{15}: Developments in gold prices, coal prices, and fund ages which are moderated by interest rates and exchange rates can have an impact on mutual funds

3. METHOD AND MATERIALS

This study was designed with a quantitative approach. Quantitative data is collected based on secondary reports from the finances of mutual funds classified as ETFs. The population used in this research is Reksadana ETFs registered in the Financial Services Authority (OJK) from 2019 to 2022 which comprises 51 companies. In determining sampling, the author uses non

Comment [i-[4]: The methodology suggest to use the other tools as this research employed the secondary data and quantitative research. **Reply:** Dear, the analytical tool used in data tabulation is MRA. This model is part of a variation of the SEM PLS method even though it is both operated with SmartPLS. However, MRA focuses on the role of moderating variables, while SEM-PLS is more generally aimed at mediating variables. There is a difference between mediating variables and moderating variables. The difference between mediating and moderating variables is that a mediator can be compared to an intermediary between two factors, but a moderator is an entity changes the direction or strength of the relationsh between two variables. In other words, the positio of the moderating variable is more complex than mediating variable. In the context of the studies reviewed, moderating variables are very suitable be applied to quantitative data compared to the function of mediating variables in SEM-PLS whi concentrate on qualitative data collected from surveys, interviews, etc. Additonally, SEM-PLS is also applied specifically to indicators/constructs th form variables.

probability samplings, one of which is purposive. Regarding the consideration or criteria set by the Reksadana ETF to represent its population, as shown in Table 1 below.

Table 1. Sampling criteria

No.	Detail of samples	Number of companies
1.	From 2020 to 2022, ETFs listed on the IDX	51
2.	ETFs that were not listed on the IDX between 2020 and 2022	(1)
3.	The ETFs have incomplete data from 2020 to 2022	(30)
Number of samples that meet the criteria		20
Observation period		4 years
Obs.		80

Source: Indonesia Stock Exchange (2023)

From Table 1, the data material that matches the criteria amounts to 20 sample companies. Table 2 displays the twenty matching samples used for data processing. The interaction test, also known as Moderated Regression Analysis (MRA), serves as the data analysis technique in this study. Also, MRA was applied to support hypothesis testing.

Table 2. Sample list of ETFs in 2019 and 2022

No.	ETF code	ETF	Investment manager	Decision date
1.	XIPI	Reksa Dana Indeks Premier ETF PEFINDO i-Grade	PT Indo Premier Investment Management	December 21, 2018
2.	XIHD	Reksadana Indeks Premier ETF IDX HIGH DIVIDEN 20	PT Indo Premier Investment Management	December 18, 2018
3.	XPFT	Reksa Dana Pinnacle FTSE Indonesia	PT Pinnacle Persada Investama	September 10, 2018
4.	XBNI	Reksa Dana Indeks BNI-AM Nusantara ETF MSCI Indone	PT BNI Asset Management	May 23, 2018
5.	XDIF	Reksa Dana Danareks ETF Indonesia Top 40	PT Danareksa Investment Management	April 23, 2018
6.	XBLQ	Reksa Dana Batavia Smart Liquid ETF	PT Batavia Prosperindo Aset Manajemen	April 10, 2018
7.	XPSG	Reksa Dana Pinnacle Indonesia ESG ETF	PT Pinnacle Persada Investama	February 02, 2018
8.	XPES	Reksa Dana Pinnacle Enhanced Sharia ETF	PT Pinnacle Persada Investama	October 12, 2017
9.	XPDV	Reksa Dana Pinncale Core High Dividend ETF	PT Pinnacle Persada Investama	June 09, 2017
10.	XISB	Premier ETF Indonesia Sovereign Bonds	PT Indo Premier Investment Management	February 02, 2017
11.	XPLQ	Reksa Dana Pinacle Enhanced Liquid ETF	PT Pinnacle Persada Investama	August 15, 2016
12.	XISC	Premier ETF Indonesia State-Owned Companies	PT Indo Premier Investment Management	October 01, 2015
13.	XIIF	Reksa Dana Premier ETF Indonesia Financial	PT Indo Premier Investment Management	November 19, 2014
14.	XISR	Reksa Dana KIK Premier ETF SRI-KEHATI	PT Indo Premier Investment Management	September 26, 2014
15.	XISI	Reksa Dana KIK Premier ETF SMinfra18	PT Indo Premier Investment Management	March 06, 2014
16.	XIJI	Reksa Dana KIK Syariah Premier ETF JII	PT Indo Premier Investment Management	April 30, 2013

17.	XIIC	Reksa Dana KIK Premier ETF Indonesia Consumer	PT Indo Premier Investment Management	April 30, 2013
18	XIIT	Reksa Dana KIK Premier IDX30	PT Indo Premier Investment Management	October 30, 2012
19.	R-ABFII	Reksa Dana KIK ABF IBI Funds	PT Bahana TCW Investment Management	December 18, 2007
20.	R-LQ45X	Reksa Dana KIK Premier LQ45	PT Indo Premier Investment Management	December 18, 2007

Source: Indonesia Stock Exchange (2023)

There are three categories developed in causality modeling (see Figure 1). First, the independent variables include expense ratio and coal price. Second, ETF fund age is set as the dependent variable. Third, the exchange rate acts as a moderating variable. Specifically for ETF fund age, the mutual fund component is a numeric type, which shows the age of each mutual fund which is calculated from the date the mutual fund was effectively traded based on a certain year.

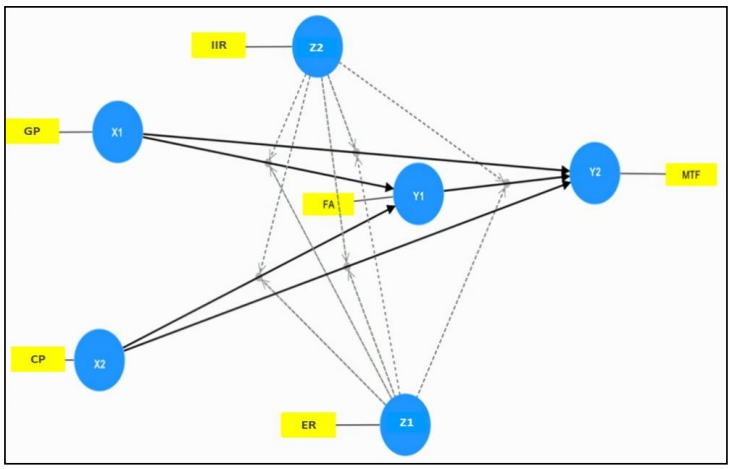

Figure 1. Proposed conceptual framework

Source: Elaborated by the authors; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The two criteria in MRA statistics include descriptive statistics and inferential statistics which are aimed at seeing the complexity of the data entity being investigated. In MRA, the moderating variable is an extension of multiple linear regression analysis (Ali & Younas, 2021; Memon et al., 2019; Woodside, 2013). Fairchild & McQuillin (2010) and Helm & Mark (2012) state that the advantages of analytical tools such as MRA can maintain the integrity of data objects and provide a basis for controlling the influence of moderator variables. Proof of hypothesis testing is operated with statistical software called SmartPLS 4. The regression equation function that adopts direct effects is created as follows:

$$Y_1 = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon_1 \quad (1)$$

$$Y_2 = \alpha_2 + \beta_3 X_1 + \beta_4 X_2 + \beta_5 Y_1 + \varepsilon_2 \quad (2)$$

Then, the moderator effect of the two variables (exchange rate and Indonesia interest rates) in the relationship between gold price and coal price on fund age and mutual fund is written below:

$$Y_1 = \alpha_3 + \beta_6 X_1 * Z_1 + \beta_7 X_2 * Z_1 + \beta_8 X_1 * Z_2 + \beta_9 X_2 * Z_2 + \varepsilon_3 \quad (3)$$

$$Y_2 = \alpha_4 + \beta_{10} X_1 * Z_1 + \beta_{11} X_2 * Z_1 + \beta_{12} Y_1 * Z_1 + \beta_{13} X_1 * Z_2 + \beta_{14} X_2 * Z_2 + \beta_{15} Y_1 * Z_2 + \varepsilon_4 \quad (4)$$

where, Y_1: Fund Age, Y_2: Mutual Fund, $\alpha_1..\alpha_4$: Constant of model, $\beta_1..\beta_{15}$: Regression coefficient, X_1: Gold Price, X_2: Coal Price, Z_1: Exchange Rate, Z_2: Indonesia Interest Rates, and $\varepsilon_1..\varepsilon_4$: Error of model.

4. RESULTS

From Table 3, consisting of 80 samples from 4 years of observation multiplied by 20 samples of ETF products, reveals an average fund age value of 5,575 with a standard deviation of 3,431, a curtosis of 1 (positive), and a skewness of 1.110 (positive). This indicates that the distribution peak is steeper than the normal distribution, and the skewness of 1.110 value indicates that the distribution tail is on the right side of the average value The average gold price of 16.41, with a standard deviation of 4,968 and a kurtosis of 4.937 (positive), shows that the distribution peaks are more steep than the regular distribution, and the skewness of -2.539 (negative) indicates the distraction tail to the left of the mean value.

Table 3. Descriptive statistics

	FA	GP	MTF	ER	IIR	CP
Mean	5,575	16,405,775	135,567,812	1,458,137.25	336,000	15,044.8
Median	5,000	17,859,000	153,056,500	1,457,226	388,500	8,876,500
Min.	1	1,701,000	12,175,000	1,431,196	4	4,942,000
Max.	15,000	19,859,000	207,799,000	1,487,061	563	43,081,000
Standard deviation	3,431	4,968,278	53,714,390	22,740,663	206,113	11,372,588
Excess kurtosis	1	4.937	1	- 1.503	-0.923	-0.246
Skewness	1.110	- 2.539	- 1.329	0	-0.704	1.051
Obs.	80	80	80	80	80	80
Cramér-von Mises test	0	3.019	1	1	1.042	1.066
Cramér-von Mises p value	0.000	0.000	0.000	0.000	0.000	0.000

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The average exchange value of 1,458,137.25 with a standard deviation of 22,740,663 and a curtosis of 1.503 (negative) indicates that the peak of the distribution is more steady than the normal distribution, as well as the skewness of 0. The data distribution tends to be symmetrical and normal-shaped. An average IIR of 336,000 with a standard deviation of 206,113 and a curtosis of -0.923, where that the distribution peak is more stable than the regular distribution, and the skewness of -0.704 indicates the distributive tail is to the left of the average value. The average coal price of 15,044,800 with a standard deviation of 11,372,588 and a curtosis of -0.246 (negative) indicates that the peak distribution is more steep than the normal distribution, and a skewness of 1.051 (positive) indicates the distribution tail is on the right side of the average value.

Table 4. Relationship between variables

Linkages	Total effects	Path coefficients	F-square	VIF
FA → MTF	0.285	0.285	0.075	1.329
CP → FA	0.308	0.308	0.049	2.505
CP → MTF	0.143	0.055	0.001	3.723
GP → FA	0.192	0.192	0.046	1.038
GP → MTF	0.023	-0.031	0.001	1.146
ER → FA	-0.004	-0.004	0.000	1.017
ER → MTF	0.054	0.055	0.004	1.020

Comment [i-[5]: From the overall findings, th is no specific argument explaining the novelty of research. **Reply:** As previously commented, the authors have made major corrections, including clarifying specific arguments surrounding the novelty of the study. You can see the revised item Chapter 1 (Introduction) and Chapter 2 (Literatur Review). There are still few publications in the pa that review the relationships between the variable models that are prepared. Besides that, we found gap in the literature by unlocking variables that w not previously analyzed, for example including interest rates and exchange rates which function a moderating variables in the relationship between t independent variable and the dependent variable.

IIR → FA	0.295	0.295	0.030	3.816
IIR → MTF	0.187	0.103	0.003	4.428
ER x GP → FA	0.015	0.015	0.000	1.017
ER x GP → MTF	0.184	0.180	0.040	1.073
ER x FA → MTF	-0.091	-0.091	0.009	1.059
ER x CP → FA	0.056	0.056	0.004	1.052
ER x CP → MTF	-0.085	-0.101	0.012	1.058
IIR x CP → FA	1.132	1.132	0.168	3.619
IIR x CP → MTF	0.576	0.254	0.005	6.006
IIR x FA → MTF	-0.232	-0.232	0.029	1.904
IIR x GP → FA	0.180	0.180	0.024	1.090
IIR x GP → MTF	0.262	0.211	0.024	1.401

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The large size effect with the criterion F-square> 0.35 is nonexistent, as indicated by the F-square in the aforementioned table. The medium effect, with an F-square between 0.15 and 0.35, represents the influence of expense ratio on exchange rate volatility. The modest influence of expense ratio on fund age, coal price on fund age, coal price on exchange rate volatility, and fund age on exchange rate volatility is due to the fact that the value of F-square falls within the range of 0.02 to 0.15. Despite disregarding the influences, none of them have an F-square less than 0.02.

Table 5. Correlation matrix

	FA	CP	GP	MTF	ER	IIR	IIR x CP	ER x FA	ER x GP	IIR x FA	ER x CP	IIR x GP
FA	1.000	-0.025	0.147	0.291	-0.005	-0.173	0.356	-0.016	-0.011	0.175	0.034	0.104
CP	-0.025	1.000	-0.040	-0.113	0.060	-0.339	-0.327	0.035	0.031	0.233	0.183	-0.085
GP	0.147	-0.040	1.000	-0.014	0.017	0.166	-0.112	-0.011	0.030	0.090	0.032	-0.045
MTF	0.291	-0.113	-0.014	1.000	0.062	0.032	0.092	-0.046	0.156	-0.063	-0.127	0.139
ER	-0.005	0.060	0.017	0.062	1.000	-0.023	-0.044	0.008	0.020	-0.012	0.037	0.078
IIR	-0.173	-0.339	0.166	0.032	-0.023	1.000	-0.627	-0.011	0.059	-0.210	-0.026	0.233
IIR x CP	0.356	-0.327	-0.112	0.092	-0.044	-0.627	1.000	-0.040	-0.076	0.295	-0.097	-0.100
ER x FA	-0.016	0.035	-0.011	-0.046	0.008	-0.011	-0.040	1.000	0.184	-0.042	0.021	0.074
ER x GP	-0.011	0.031	0.030	0.156	0.020	0.059	-0.076	0.184	1.000	0.063	-0.075	-0.019
IIR x FA	0.175	0.233	0.090	-0.063	-0.012	-0.210	0.295	-0.042	0.063	1.000	-0.013	0.305
ER x CP	0.034	0.183	0.032	-0.127	0.037	-0.026	-0.097	0.021	-0.075	-0.013	1.000	-0.078
IIR x GP	0.104	-0.085	-0.045	0.139	0.078	0.233	-0.100	0.074	-0.019	0.305	-0.078	1.000

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

VIF should be less than 5, because values greater than 5 indicate collinearity between structures (Hair et al., 2017). In the PLS-SEM guidline, the VIF of the inner model shows how often strong correlations exist between free variables. This is also known as multicolinearity. Multicollinearity is not a concern, as there are no VIF greater than 5, as shown in Table 5. Multicolinearity is a phenomenon characterized by a high correlation between two or more free variables or independent constructions, resulting in poor model predictability (Masmuddin et al., 2024).

Table 6 indicates that there is no significant correlation (more than 0.9 or less than -0.9) between the latent variables, thereby ruling out any issues with multicollinearity. Covariance analysis is a statistical technique that combines regression analysis and variance analysis.

Consequently, conducting a covariate analysis necessitates testing a hypothetical condition for both regression analysis and variant analysis.

Table 6. Summary of covarians

	FA	CP	GP	MTF	ER	IIR	IIR x CP	ER x FA	ER x GP	IIR x FA	ER x CP	IIR x GP
FA	1.000	-0.025	0.147	0.291	-0.005	-0.173	-0.01	-0.01	0.03	0.21	0.16	0.08
CP	-0.025	1.000	-0.040	-0.113	0.060	-0.339	0.032	0.035	0.188	-0.197	0.215	-0.06
GP	0.147	-0.040	1.000	-0.014	0.017	0.166	0.032	-0.01	0.032	-0.068	0.083	-0.03
MTF	0.291	-0.113	-0.014	1.000	0.062	0.032	0.163	-0.04	-0.13	0.056	-0.05	0.111
ER	-0.005	0.060	0.017	0.062	1.000	-0.023	0.021	0.008	0.038	-0.026	-0.01	0.062
IIR	-0.173	-0.339	0.166	0.032	-0.023	1.000	0.062	-0.01	-0.02	-0.379	-0.19	0.186
IIR x CP	-0.011	0.032	0.032	0.163	0.021	0.062	1.097	0.192	-0.08	-0.048	0.061	-0.01
ER x FA	-0.016	0.035	-0.011	-0.045	0.008	-0.011	0.192	0.988	0.021	-0.024	-0.04	0.059
ER x GP	0.035	0.188	0.032	-0.130	0.038	-0.026	-0.081	0.021	1.053	-0.060	-0.01	-0.06
IIR x FA	0.215	-0.197	-0.068	0.056	-0.026	-0.379	-0.048	-0.02	-0.06	0.365	0.165	-0.05
ER x CP	0.162	0.215	0.083	-0.058	-0.011	-0.193	0.061	-0.03	-0.01	0.165	0.851	0.224
IIR x GP	0.083	-0.068	-0.035	0.111	0.062	0.186	-0.016	0.059	-0.06	-0.048	0.224	0.633

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The analysis of the determination coefficient leads to the following conclusions: The R-square value has a joint or simultaneous influence on the price of coal and gold, as well as the interaction with the exchange rate. For this relationship, the coefficient of determination is 0.139, with an adjusted R-square of 0.076. Therefore, all external constructions simultaneously impact on fund age, leading to a 13.9% effect. The conclusion is that the impact of all independent variables is modest, given that the adjusted R-square is below 13.9% (see Table 7). To satisfy the fit model criterion, the SMSR score should be below 0.05 (Cangur & Ercan, 2015). Basically, an SRMR of less than 0.10 or 0.08 with an NFI of greater than 0.9 is a criterion for model limitations or fit.

Table 7. Assessment of model feasibility

	R-square	R-square adjusted
FA	0.230	0.144
MTF	0.182	0.051
	Saturated model	Estimated model
SRMR	0.000	0.007
d_ULS	0.000	0.166
d_G	0.000	0.064
Chi-square	0.000	32.767
NFI	1.000	0.198
	BIC	
FA	17.423	–
MTF	35.489	–

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, MTF = Mutual Funds, SMSR = Standardized Root Mean Square, NFI = Normalized Fit Index, BIC = Bayesian Information Criterion, d_ULS = Squared Euclidean Distance, and d_G = Geodesic Distance.

This study's probability of 0.400> 0.05 indicates that the price of coal during the 2020–2022 period does not significantly impact the fund age ETF. From Figure 1, the relationship is not significant, even if it is positive. However, if the price variable of coal is significant to the fund age ETF, it will sustain the investment in the ETF and extend its life. The SmartPLS 4

statistical process demonstrates that the interaction of interest rate and coal price influences the age rate of the fund. The probability of acquiring the value is 0.010, which is lower than the significance level of 0.05. The positive relationship indicates that coal's interest rate and price interaction can affect the fund ages ETF. The relatively low interest rate movement and the stable interaction with the fluctuating carbon price movement of carbon affect the age rate of the fund. According to the effect of exchange rate and coal price on fund age ETFs, a probability of 0.049 <0.05 indicates a significant and positive relationship. This implies that the exchange rate and coal price interaction can influence the age of the ETF. The relatively high and stable exchange-rate movement influences the fund age of the ETF, as does the fluctuating price of coal.

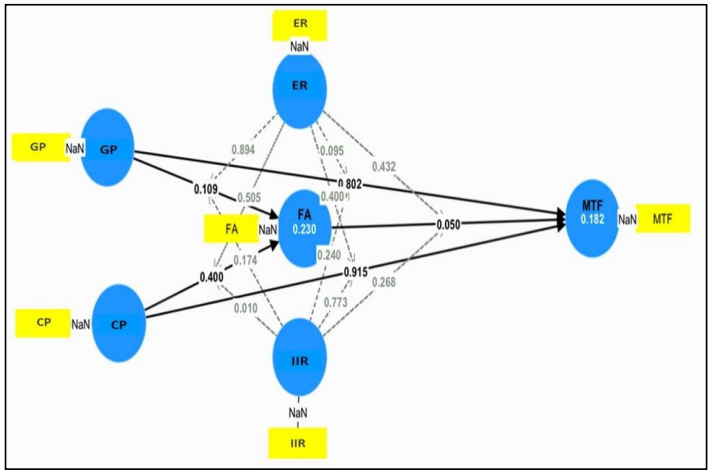

Figure 2. The link between variables

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The impact of the gold price on fund-age ETFs indicates that the period from 2020 to 2022 does not have a significant impact on fund-age ETFs. A probability of 0.109, greater than 0.05 (supports this). Additionally, an increase in the realist price movement of gold extends the investment life of the ETF, given the significant relationship between gold's price and the fund age. The influence of the interest rate and gold price on fund age ETFs shows that the probability of 0.174 is less than 0.05, indicating that the linkage is positive. There is an implication that the interaction between the interest rate and gold price does not impact the age of the ETF. Specifically, a relatively low and stable interest rate movement that interacts with a relatively rising gold price movement does not affect the ETF's age or fund age level.

The influence of the exchange value and gold price interaction on the fund age ETF is insignificant, with a probability of 0.894 <0.05. The positive relationship suggests that the exchange rate and gold price interaction does not influence the fund-age ETF. In particular, a relatively high and stable exchange value movement that interacts with fluctuating coal price movements does not affect the ETF's fund age (see Table 8).

Table 8. Path coefficients: mean, STDEV, t-statistics, and probability

Lingkages	Original sample	Sample mean	STDEV	T-statistics	Prob.
FA → MTF	0.285	0.246	0.146	1.958	0.050
CP → FA	0.308	0.462	0.365	0.842	0.400
CP → MTF	0.055	0.285	0.516	0.106	0.915
GP → FA	0.192	0.180	0.119	1.604	0.109

GP → MTF	-0.031	-0.036	0.125	0.251	0.802
ER → FA	-0.004	0.004	0.105	0.038	0.970
ER → MTF	0.055	0.060	0.109	0.510	0.610
IIR → FA	0.295	0.481	0.398	0.742	0.458
IIR → MTF	0.103	0.343	0.578	0.179	0.858
ER x GP → FA	0.015	0.007	0.113	0.133	0.894
ER x GP → MTF	0.180	0.163	0.108	1.668	0.095
ER x FA → MTF	0.156	0.154	0.184	1.967	0.049
ER x CP → FA	-0.101	-0.097	0.120	0.841	0.400
ER x CP → MTF	-0.091	-0.083	0.116	0.785	0.432
IIR x CP → FA	-0.232	-0.290	0.210	1.107	0.268
IIR x CP → MTF	0.180	0.162	0.132	1.361	0.174
IIR x FA → MTF	0.211	0.202	0.179	1.175	0.240
IIR x GP → FA	1.132	1.365	0.439	2.579	0.010
IIR x GP → MTF	0.254	0.622	0.878	0.289	0.773

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, CP = Coal Price, and STDEV = Standard Deviation.

The coal price does not significantly influence the ETF's performance during the 2020–2022 period, as indicated by the probability of 0.373> 0.05. Even though the statistical output found an insignificant effect, the relationship was positive. However, a fluctuating coal price will sustain the ETF's investment performance, and a significant correlation between the coal price variables will enhance the fund age ETF's investment performance. Based on data processing via SmartPLS 4, the probability shows 0.970> 0.05 with a positive relationship in exchange rate movements during the observation period. Unstable exchange rate movements marked by the weakening of the domestic currency (Rupiah/IDR) against the USD can affect ETF performance.

The positive relationship between interest rate and ETF performance indicates that the probability of 0.454 <0.05 is insignificant. These findings detect that interest rate movements during the observation, the relatively low interest rate movement, the existence of decreases during pandemic periods, or the post-pandemic movement of the interest rate do not influence the ETF's performance. In other words, the performance of such ETFs is relatively stable. The influence between the exchange rate and gold prices on ETF performance is shown by a probability of 0.896 <0.05 or in the insignificant category with a positive relationship. Therefore, with relatively high exchange rate movements, a weakening of the IDR against the USD during the pandemic, or the post-pandemic period do not influence the ETF's performance, as the exchange rate movements remain relatively stable and high, interacting with relatively low, and stable gold price movements.

Table 9. Indirect effects: mean, STDEV, t-statistics, and probability

Lingkages	Original sample	Sample mean	STDEV	T-statistics	Prob.
CP → MTF	0.088	0.090	0.099	1.990	0.373
GP → MTF	0.055	0.044	0.043	1.259	0.208
ER → MTF	-0.001	0.000	0.030	0.038	0.970
IIR → MTF	0.084	0.099	0.112	0.749	0.454
ER x GP → MTF	0.004	0.002	0.033	0.130	0.896
ER x CP → MTF	0.016	0.014	0.026	0.623	0.533
IIR x GP → MTF	0.051	0.043	0.046	1.104	0.270
IIR x CP → MTF	0.323	0.314	0.211	1.525	0.127

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, CP = Coal Price, and STDEV = Standard Deviation.

Referring to Table 9 above, the influence of exchange rate and coal-price interactions on the performance of ETFs is insignificant, as evidenced by the probability of 0.533 <0.05. This positive relationship is represented by relatively high exchange rate movements, weakening of the IDR against the USD during the pandemic and post-pandemic period, and fluctuating coal prices, which do not affect the ETF's performance. The positive relationship in the interaction between interest rates and coal prices on ETF performance is shown with an insignificant probability (0.127 <0.05). This fact is shown by the shift in interest rates throughout the observations, where the movement in interest rates has decreased since the pandemic and after the pandemic which does not affect the performance of ETFs. Also, interest rates and gold prices have an insignificant effect on ETF performance as evidenced by a probability of 0.270 <0.05. In reality, although the impact is not significant, there is a positive relationship between these variables because it is triggered by inconsistent interest rate movements and affects ETF performance in the short term.

5. DISCUSSION

The direct relationship between gold price and coal price to fund age as well as the direct relationship between gold price, coal price and fund age to mutual funds have been widely discussed by several publications in past editions. Also, indirect causality between gold price and coal price on fund age involving the role of exchange rate and interest rate or the impact of gold price, coal price and fund age in influencing mutual funds through exchange rate and interest rate has been highlighted in scientific works contained in several previous publishers.

Papers from across countries highlight direct and indirect links compared according to the relevance of the topic or model studied. First, the relationship between gold price and fund age. Fauzyah et al. (2024) and Muttaqin & Putri (2024) predict that literacy and gold price perspective have a positive effect on interest in investing in Indonesia as measured by the fund age parameter. Second, the synergy between coal price and fund age. Aziz et al. (2020) estimate that the increase in coal prices will enable an increase in the profitability of mining companies in Indonesia, while preferences from China are projected that the transmission of shocks and variations in coal prices will have a negative impact on the trading industry, especially fund age in the majority of financial institutions (Lin & Wang, 2021; Zhihua et al., 2011). Third, the connection between gold price and mutual funds. In the USA, Blose (1996) predicted that gold price elasticity brings risks to gold mutual funds, while Juwita et al. (2022) stated that there is no significant difference between the price of gold and Indonesian money market mutual funds. Fourth, the impact of coal prices on mutual funds. The price of steamed coal has a long-term impact on China's financial markets (Wen, 2023), instability such as global coal commodity prices has a spillover effect on the net asset value of mutual funds in Indonesia (Gustinanda, 2024), the increase in coal prices internationally has a significant impact statistically significant for stock returns (Ratti & Hasan, 2011), and the external factor that has a dominant influence on stock returns of coal companies in Indonesia is changes in coal export prices (Komara et al., 2019). Fifth, fund age of mutual funds. Audita et al. (2023) and Nur & Fernandika (2022) confirmed that fund age was able to increase fixed income mutual funds registered with the Indonesian OJK, while Farid & Wahba (2022) validated that fund age actually had a negative impact on mutual fund investment in Egypt.

Sixth, gold price against fund age through the exchange rate. Rahmansyah & Rani (2021) visualize that the price of gold has an insignificant effect on the price of gold shares and the USD exchange rate has a negative impact on the price of gold shares in the long term and short term for the case of PT Aneka Tambang Indonesia. On the one hand, Risman et al. (2017) revealed that the price of gold commodities which is mediated by the exchange rate (IDR/USD) can significantly influence company value. Yet, these findings are contrary to what was explained by Robiyanto (2018), where the price of gold had a negative effect on

returns on the Composite Stock Price Index (IHSG) and Jakarta Islamic Index (JII) due to shifts in the BI rate and exchange rate (USD–IDR). Seventh, gold price against fund age via interest rate. Changes in gold prices relative to real interest rates and vice versa are an essential interpretation of managers in determining capital market expectations in Malaysia (Abdullah & Abu Bakar, 2015). On the object of PT Bank Mandiri Medan–Indonesia Branch, Pasaribu et al. (2021) confirms that interest rates have an insignificant effect on the amount of savings, while the price of gold contributes significantly to the amount of Third Party Funds (DPK). Eighth, coal price against fund age is moderated by the exchange rate. As is the case in Indonesia, Widati et al. (2023) proves that fund age growth is determined by international coal prices and exchange rates. Ninth, coal price against fund age which is moderated by the interest rate. The facts show that the performance of coal companies listed on IDX is inseparable from coal commodity prices that exceed limits, asset structure and interest rate policies set by Bank Indonesia (Surahman et al., 2022; Sutomo et al., 2020).

Tenth, the relevance of the gold price to mutual funds through the exchange rate. Arisandhi & Robiyanto (2022) analyzed that gold prices and exchange rates had a weak correlation with stock prices in ASEAN-5 throughout the pandemic. With a negative correlation, it indicates that the exchange rate is a safer alternative asset than gold in boosting stock prices. Besides that, Ginting & Gularso (2023) diagnosed that the exchange rate mediated by fundamental aspects such as the exchange rate can influence stock returns in telecommunications industry companies in Indonesia. Eleventh, the relevance of the gold price to mutual funds through the interest rate. Widjanarko et al. (2020) concluded that interest rates and gold prices have a negative effect on stock performance in manufacturing companies in Indonesia. Then, Shafiee & Topal (2010) tested the trend of gold price uncertainty which was influenced by investment decisions and interest rate fluctuations. Twelfth, the role of the exchange rate in the relationship between coal prices and mutual funds. Here, Churchill et al. (2019) show that the causality between coal prices and the exchange rate (USD) shows non-linearity over time and Setyani & Gunarsih (2018) illustrate that the exchange rate has a negative effect on Sharia mutual fund investment in Indonesia. Thirteenth, the role of interest rates in the relationship between coal prices and mutual funds. Variables such as interest rates and gold supply have negative risks for stock mutual fund products in Indonesia (Cheng & Dewi, 2020). Fourteenth, the function of the exchange rate in the relationship between fund age and mutual funds. According to Wijayanti et al. (2023), fund age does not have a significant effect on the performance of Indonesian mutual funds. Meanwhile, Sholeha & Fadhlillah (2023) examined that the exchange rate was proven to have no partial effect on the Net Asset Value (NAV) of Sharia mutual funds in Indonesia, while Białkowski & Otten (2011) detected that fund age adjusted for the exchange rate appeared to be less effective opportunities and advantages efficiently to the mutual fund ecosystem in a leading emerging market (in this case Poland). Fifteenth, the function of the interest rate in the relationship between fund age and mutual funds. The size and returns of funds in the US interest rate market have a broad impact on the survival capacity of mutual funds (Fabregat-Aibar et al., 2017).

6. CONCLUSION

All the correlations between the variables under consideration are shown in the first model of this study, which looks at the effects of gold, coal, interest rates, exchange rates, and the interaction between interest rates and prices. This review discovered a positive correlation between gold prices, the interaction between coal prices and exchange rates, and the interaction between gold prices and exchange rates in fund age ETF mutual funds traded on the IDX. Likewise, there is a robust positive relationship between gold prices and the age of ETF funds. This implies that the ETF's fund age may be impacted by the comparatively minor

Comment [i-[6]: The conclusion does not provide summary of main finding, implication and contribution. **Reply:** Findings are described based two models. First, direct causality. Second, indirec causality. Because the investigation model is operated using MRA, specific conclusions are needed to answer the proposed hypothesis. A summary of the statistical output is contained in paragraphs 1 and 2. Furthermore, contributions ar implications are explained in paragraph 3. This paragraph is a new paragraph (additional revision with the aim of revealing empirical implications, channeling policy direction, and providing understanding of decision making for sustainable investment.

shift in gold prices during the 2020–2022 monitoring period. This positive pattern implies that the upward trend in the relatively low gold price can extend the life of the ETF investment. Additionally, the existence of positive and significant causality between ETF Fund age and ETF performance indicates that the better the ETF performance, the longer the ETF fund age traded on the IDX.

Based on the SmartPLS 4, the second model examines the direct impacts of fund age, gold prices, and coal prices on the performance of ETF mutual funds. Along with the indirect effects of coal and gold prices on ETF performance through fund age, it also examines the interaction effect of exchange rates on prices. The second model looks at the direct effects that coal prices, fund age, and gold prices have on ETF performance. It also looks at the positive but not statistically significant interaction effect of interest rates on gold, coal, and fund age on ETF performance. Only the relationship between fund age and mutual fund performance exhibits a positive and statistically significant effect; the older the fund age of an ETF, the better its performance. Finally, ETF performance can be found in the movement of its net assets; the longer an ETF has been listed on the IDX, the better its performance has been.

Although the originality and novelty of the current study provide a fresher contribution than the study in the previous edition, we realize that there are still shortcomings. Thus, the limitations of the study can become constructive insights in the next agenda by expanding knowledge of the characteristics of input variables. The urgency of developing the concept can provide a solution about the fluctuating movement of coal prices. Government policy through intervention on coal price levels is also able to encourage better ETF performance and provide flexibility for investors to maintain the life of ETF investments. The practical implications of the above scheme are expected to be able to increase the liquidity of investments traded by IDX.

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CURRENCY EXCHANGE RATE VOLATILITY AS A MODERATING EFFECT OF THE GOLD AND COAL PRICE AGAINST FUND AGE AND MUTUAL FUND IN INDONESIA

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ABSTRACT

Shifts in gold and coal prices have a crucial impact on the macro economy, especially investment growth. On a financial scale, there is still little discussion of the relationship between gold and coal prices and stock mutual funds. Also, the role of exchange rates and interest rates in moderating this relationship has not been examined. This research reviews the performance of exchange-traded funds (ETFs) in the scope of fund age and Indonesian stock mutual funds which are influenced by gold and coal prices with the moderating effect of interest rates and exchange rates. Core data was obtained from 20 companies as mutual fund owners officially registered with the Financial Services Authority (OJK) throughout 2019–2022. By operating Moderated Regression Analysis (MRA) into SmartPLS 4, there are interactions between prices and exchange rates, prices and interest rates, and prices and gold prices. As with the relationship between the age of ETF mutual funds traded on the Indonesian Stock Exchange (IDX) and the gold price, these two variables have a strong and positive correlation. This implies that relatively small changes in gold prices over the monitoring period may impact the fund age ETF. This positive association shows that an ETF investment can have its life extended by a relatively small increase in gold prices. This research indicates a strong causality, which improves the ETF's performance on the IDX as fund age rises. Furthermore, the second model examines how fund age, gold, and coal have a direct impact on ETF mutual fund performance. It also looks closely at how indirectly coal, gold, and fund age affect ETF performance. The age of the fund, gold, coal, and exchange rates affect the performance of ETFs. While the effect is not statistically significant, interest rates, gold, coal, and fund age have a beneficial impact on ETF performance. Implications for policy makers to monitor and re-evaluate commodity price fluctuations using mining production regulation scenarios that are balanced with quality. Weaknesses of the current study such as the observation period need to be taken into consideration in future research.

Keywords: *coal price; gold price; fund age; exchange traded funds*

1. INTRODUCTION

Several nations have had challenges substituting coal with alternative energy sources in specific sectors, primarily because of its cost-effectiveness. The elasticity of coal prices increased due to the conflict between Russian with Ukraine, the leading coal producer, which restricted coal exports to other nations (van Meijl et al., 2024; Wang et al., 2022; Yagi & Managi, 2023). Coal is increasingly emerging as a significant global energy source, and fluctuations in coal prices have significantly influenced the profitability of businesses in this sector (Azis et al., 2020; Hassan et al., 2024). A robust model for forecasting coal price

Comment [i-[7]: Studies relating to Indonesia stock mutual funds on interest rate and exchange volatility have been widely highlighted. What mak this study different from others is that it concentra on data from 51 companies officially registered w the Financial Services Authority (OJK) Indonesia using short-term methods and data. The use of multiple statistical methods provides a robust framework for analyzing the data, allowing for a nuanced understanding of the relationships betwe the key variables. Then, the presentation of the analysis is reviewed interestingly and supported w various past studies in the discussion section. **Rep** Dear, the presentation and discussion of this study was carried out optimally. Therefore, the authors openly accept all reviewer input to improve the quality of the manuscript before publication. Onc again, we appreciate all the guidance.

Comment [i-[8]: The manuscript provides a good idea about the current situation in Indonesia The author has used details from 20 companies based on specific inclusion criteria. **Reply:** Thank you, the authors have tried to show their best by involving 20 companies to be tested based on the existing analysis model.

Comment [i-[9]: Abstract not provide researc problem and objective, the mainly significant, the is a poor of linking between the title and abstract body. **Reply:** The problem and research objective are explained at the beginning of the abstract secti Also, the link between the title and the content of abstract has been adjusted correctly.

Comment [i-[10]: Presentation of abstract should be improved. Please give a brief introducti and problem statement before study objective. Ple also include policy implication after findings. It w be helpful to discuss the implication to policy makers (government). The authors should include limitations and future research of the study. **Reply** This suggestion was followed.

Comment [i-[11]: Certainly, the topic is thou provoking and useful. The author has used moderated regression analysis, which is a very us technique. The findings were explained very clear The abstract is quite focused and the author has followed the correct formatting through out the assignment. **Reply:** We appreciate your review. B following the correct format, at least some errors (inside and outside of the content) can be reduced

Comment [i-[12]: In the introduction: researc design is not clear, no data is presented, the phenomenon does not appear, there is no insight a plan to the problem-solving effort, research problems, research objective, and benefits will be strong enough. **Reply:** The introduction has been modified with a clear design, including including data at the beginning and bringing up factual phenomena to strengthen insights. In addition, the problems, objectives, and benefits of research are specifically described as motivation in building theoretical knowledge and practical policies.

indices can serve as an effective tool for firms that rely on coal consumption, enabling them to optimize their coal purchase plans and contribute to the reduction of global carbon emissions. The ETF-energy portfolio can integrate this model as a performance instrument. In certain countries, the rising interest in gold investment due to fluctuations in gold prices has led to a considerable shift from random investments to gold investments as a means of generating higher revenue.

The central bank, which controls monetary policy to maintain currency stability, is now observing a decline in interest rates and exchange rates versus the US dollar (USD). Macroeconomic factors, such as changes in interest rates and exchange rates can influence the value of the depository's fund, which in turn affects the performance of these depositories (Gerlach et al., 2018; Keshtgar et al., 2020; Kurniawan & Prajanti, 2017; Purwono et al., 2020).

Indonesia is a developing market that is famous for its wealth of mineral resources (Ascher, 2012; Hajad et al., 2023). Domestic mineral resources that can be found include oil, gold, gas and coal. Ekananda (2022) describes that the majority of macroeconomics in Indonesia rely on natural resource products which contribute to the growth of Gross Domestic Product (GDP). Primary mineral commodity trading aims to gain profits from mineral exchanges that encourage economic growth through Balance of Trade (BOT). Indonesia's energy needs are determined by the mining sector which plays a fairly large role with a contribution of 12.22% to GDP in 2022 (BPS-Statistics Indonesia, 2024).

In general, An et al. (2020), Fajarini & Darmawan (2024), Melas & Michail (2024), Putra & Robiyanto (2019), Soelistijo et al. (2015), and Zhu et al. (2023) revealed that mineral commodities have an impact on stock prices. To our knowledge, no study has explored the influence of currency exchange rate moderation on the correlation between global coal prices and the fund age ETF Reksadana shares. The goal of this project is to close these gaps. The study's design incorporated the subsequent primary research inquiries: (1) Examined the effects of various factors, including coal price, gold price, exchange rate, and interest rate interaction, exchange rate and gold price interaction, exchange rate interaction with coal rate, and the interaction of exchange rate and gold price, on the performance of fund age ETFs traded on the IDX; and (2) Explores the immediate impact of coal price, gold price, and fund age on the ETF group's performance. The findings also examined the indirect relationships between coal and gold prices, taking into account the impact of the fund's age on an ETF's performance. Furthermore, it investigated the effect of exchange value interactions on coal and gold prices, as well as the fund's age. It also examined the impact of interest rate interactions on coal and gold prices, as well as the fund's age, on the ETF's performance.

The initial and subsequent models analyze the influence of coal and gold prices on the assets of the Indonesian nation, necessitating proficient administration to attract investors in particular industries. The government uses interest rate and exchange value as a policy tool to maintain macroeconomic stability, especially in specific industries (Li et al., 2021). This paper identifies the relationship between interest rate and coal interaction and price, interest rate and gold interaction, exchange value and price of coal, interaction of exchange values, and gold price with fund age ETFs traded on the IDX. Investors may gain confidence when they observe a fund's age of investment increasing, since they interpret this as an indication of a higher investment value (Bai et al., 2019; Joshi & Sebastian, 2022; Nguyen et al., 2018; Saleem et al., 2021).

By looking at the above phenomenon, the current study is designed to identify the impact of two essential commodity prices in the world, *i.e* gold and coal on fund age and mutual funds which are bridging by exchange rates and interest rates. The insights in this new study are focused not only on linking gold prices and coal prices to fund age and mutual funds, but are also varied by including the role of exchange rates and tribes in the relationship between the

two commodities to push fund age and mutual funds in a positive direction. The benefits of the analysis output make it possible to solve problems in the future, which makes it easier for investors to plan buying and selling transactions for ETF products in the hope of getting convenience, transparent information, diversification, affordable capital and liquidity. Also, the usefulness of the study is a consideration for banks in determining interest rates to stimulate exchange rate stability.

2. LITERATURE REVIEW

The investment management selected stocks to optimize the value of the ETF portfolio. The volatility of coal prices affects the worth of the retailer's portfolio by controlling their performance, which is influenced by the movement of coal prices. Due to the calm movement of exchange rates, the massive Russian invasion of Ukraine triggered a dynamic movement in commodity prices (Chen et al., 2023; Maurya et al., 2023). Investors expect fund age, a key measure of factors influencing ETF performance to assist in developing more efficient ETF portfolios and to assist fund providers in enhancing the quality of their offerings (Tripathi & Sethi, 2022). Kasongwa & Minja (2022) explains that the influence of interest rate and exchange value interactions on coal and gold prices moderately improves ETF market performance. Differences in size and volume between ETFs and their underlying portfolios, based on fund age and pricing errors, explain ETF performance gaps, which fundamentally vary cross-sectionally over time (Pham et al., 2021).

The movement of exchange rate interactions at fund age influences the gaps in the performance of ETFs. An increase in currency exchange rates indicates their interaction at the volume and size of fund age, thereby minimizing the impact of pricing errors on ETF performance. This is because transactions involving coal and gold between countries require stable exchange rate movements (Setiawanta et al., 2020). Global risk factors, primarily associated with the volatility of coal and gold prices, significantly restrict the ability to independently implement monetary policy through interest rate and exchange rate lines, thereby enhancing the performance of ETF markets and negatively impacting real economic growth (Aloui et al., 2018; Alsubaiei et al., 2024; Sanderson & Lumpkin-Sowers, 2018). The supply and demand of the USD, along with value fluctuations, consistently influence the value of gold. The purchasing power of people, impacted by various conditions or economic conditions, influences the value of the USD and subsequently the price of gold.

In the context of currency exchange rates, a depressed USD relative to other currencies will lead to a surge in demand for US commodities, particularly gold, given their valuation in USD. As a result, the price of gold will rise. When the value of the USD decreases, people in countries with a different currency can buy or invest in US gold at a lower price. This is due to the fact that the value of gold in USD decreases, thereby making it more affordable. As a result, individuals with other currencies must pay a higher price to purchase gold from the US, and in some cases, they may not be able to afford to purchase it at all. This decrease in demand for gold has resulted in a fall in its price (Al-Ameer et al., 2018; Arisandhi & Robiyanto, 2022; Betancur-Corredor et al., 2018; Hendro et al., 2020). The price of gold changed as the stock market collapsed (Al-Ameer et al., 2018; Mensi et al., 2013; Padungsaksawasdi, 2020). As a result, gold investors' sentiment in relation to expected gold price movements can flow into the stock market, causing contagious effects. If the gold investor carries the same information as the equity investor, the stock market activity will respond to the change in that gold investor.

The economy is experiencing a persistent appreciation of currency exchange rates, accompanied by substantial volatility over time. Inflation rates, interest rates, political instability, economic performance, and external debt typically determine the volatility of the

Comment [i-[13]: In literature review: The st does not use current and update literature review, includes is not in accordance with the variables research. This paper should built the hypothesis development to make the empirical position clear **Reply:** The literature review is updated based on latest empirical findings regarding the variables analyzed, especially adding and upgrading citatio Also, our outline the proposed hypotheses specifically.

Comment [i-[14]: The study covers all the ma aspects. However, the following issues needs consideration/action. The literature review could have touched a bit on how is the relationship between gold/coal prices and fund age and mutua funds in other countries who are similar to Indone This would have added more value to the context and improved the importance of this study. There should be literature support to project fund age as mediator variable. This should be included. **Reply** The authors realize that studies discussing the relationship between gold and coal prices mediate by interest rates and exchange rates on fund age a mutual funds are still limited. This includes the context in Indonesia and many countries. With a scant literature review, we made maximum efforts increase the research contribution. What you sugg was also highlighted by the first reviewer. Therefo we include and combine important points related t the relationships between variables as the foundat for proposing hypotheses. You can see the recent changes in the hypothesis formula at the end of th paragraph in *Chapter 2* (*Literature Review*).

currency exchange rate, which ultimately affects the number of investors in the stock markets (Ghauri et al., 2024; Hendro et al., 2020; Setiawanta et al., 2020; Zubair & Aladejare, 2017). Indonesia's important role as an exporter of coal bricks has a significant impact on exchange rates. This encourages us to do research on the exchange rate and price of coal in Indonesia (Chandrarin et al., 2022). The reverse correlation between currency exchange rates and coal prices suggests that the Indonesian currency is rising in value relative to the USD. The empirical conclusions we have drawn have important implications for the central bank authorities in their efforts to control the exchange rate by optimizing the value of coal benefits through exchange-rate lines.

Interest rates are among the monetary tools used for economic intervention (Christou et al., 2020; Umoru & Hussaini, 2022). In addition to interest rate swings, stock market performance indicators also have an impact on investors' decisions regarding the performance of the unofficial sector of the market. According to research, interest rates initially have a beneficial impact on investment growth but subsequently start to exert negative pressure on rises in investment.

So far, fund age determined by commodity prices (gold and coal) compared by Akhmadi et al. (2023) and Zufa & Prasetyo (2023). In fact, market timing in gold stocks is crucial to the life of a mutual fund. In essence, gold stocks have a relatively high risk for mutual fund investment. But, increasingly expensive global energy prices such as coal have a significant impact on the Indonesian stock index (Yasri & Anas, 2023). The relevance of commodity prices (gold and coal) and fund age to mutual funds is also tested. In this context, Gwilym et al. (2011) and Shabbir et al. (2020) argue that the specialization of gold prices can provide explanatory power to future stock markets. It can also be understood about the effect of coal prices on mutual funds, where mutual funds in energy equity are triggered by more systemic market movements (Malhotra & Nippani, 2024). Marti-Ballester (2019) stated that the price of conventional energy (including coal) is an integration in mutual fund investment decisions. In short, equity mutual funds still depend on coal trading even though decarbonization movements are being carried out by some companies as an effort to reduce carbon emissions (Rohleder et al., 2022). Moreover, the correlation between fund age and mutual funds is positive. This was revealed by Fajrinda et al. (2022), Hada & Suri (2020), and Rachmayanti et al. (2023) that fund age can improve mutual fund performance.

In the scientific space, the connection in fund age and mutual fund mechanisms formed by trends in gold and coal prices through interest rates and exchange rates has never been analyzed. In fact, interest rates and exchange rates are monetary policies. In principle, this policy is a scheme that can control and at least be an initial parameter for investors in seeing patterns in fund age and mutual funds which at any time can experience shifts according to the dynamics of gold and coal prices. The terminology about the role of interest rates and exchange rates in the role of coal and gold prices on fund age and mutual funds opens up academic and theoretical gaps, making it ideal for follow-up. To develop the position and function of each study variable, study hypotheses that can be built are as follows:

H_1 and H_2: The increase in gold prices and coal prices can increase fund age.H_3, H_4, and H_5: Gold prices, coal prices, and fund age are able to grow fund age.

H_6, H_7, H_8, and H_9: Gold prices and coal prices, which are moderated by interest rates and exchange rates, have an impact on fund age.

H_{10}, H_{11}, H_{12}, H_{13}, H_{14}, and H_{15}: Developments in gold prices, coal prices, and fund ages which are moderated by interest rates and exchange rates can have an impact on mutual funds

3. METHOD AND MATERIALS

This study was designed with a quantitative approach. Quantitative data is collected based on secondary reports from the finances of mutual funds classified as ETFs. The population used in this research is Reksadana ETFs registered in the Financial Services Authority (OJK) from 2019 to 2022 which comprises 51 companies. In determining sampling, the author uses non probability samplings, one of which is purposive. Regarding the consideration or criteria set by the Reksadana ETF to represent its population, as shown in Table 1 below.

Table 1. Sampling criteria

No.	Detail of samples	Number of companies
1.	From 2020 to 2022, ETFs listed on the IDX	51
2.	ETFs that were not listed on the IDX between 2020 and 2022	(1)
3.	The ETFs have incomplete data from 2020 to 2022	(30)
Number of samples that meet the criteria		20
Observation period		4 years
Obs.		80

Source: Indonesia Stock Exchange (2023)

From Table 1, the data material that matches the criteria amounts to 20 sample companies. Table 2 displays the twenty matching samples used for data processing. The interaction test, also known as Moderated Regression Analysis (MRA), serves as the data analysis technique in this study. Also, MRA was applied to support hypothesis testing.

Table 2. Sample list of ETFs in 2019 and 2022

No.	ETF code	ETF	Investment manager	Decision date
1.	XIPI	Reksa Dana Indeks Premier ETF PEFINDO i-Grade	PT Indo Premier Investment Management	December 21, 2018
2.	XIHD	Reksadana Indeks Premier ETF IDX HIGH DIVIDEN 20	PT Indo Premier Investment Management	December 18, 2018
3.	XPFT	Reksa Dana Pinnacle FTSE Indonesia	PT Pinnacle Persada Investama	September 10, 2018
4.	XBNI	Reksa Dana Indeks BNI-AM Nusantara ETF MSCI Indone	PT BNI Asset Management	May 23, 2018
5.	XDIF	Reksa Dana Danareks ETF Indonesia Top 40	PT Danareksa Investment Management	April 23, 2018
6.	XBLQ	Reksa Dana Batavia Smart Liquid ETF	PT Batavia Prosperindo Aset Manajemen	April 10, 2018
7.	XPSG	Reksa Dana Pinnacle Indonesia ESG ETF	PT Pinnacle Persada Investama	February 02, 2018
8.	XPES	Reksa Dana Pinnacle Enhanced Sharia ETF	PT Pinnacle Persada Investama	October 12, 2017
9.	XPDV	Reksa Dana Pinncale Core High Dividend ETF	PT Pinnacle Persada Investama	June 09, 2017
10.	XISB	Premier ETF Indonesia Sovereign Bonds	PT Indo Premier Investment Management	February 02, 2017
11.	XPLQ	Reksa Dana Pinacle Enhanced Liquid ETF	PT Pinnacle Persada Investama	August 15, 2016
12.	XISC	Premier ETF Indonesia State-Owned Companies	PT Indo Premier Investment Management	October 01, 2015
13.	XIIF	Reksa Dana Premier ETF Indonesia Financial	PT Indo Premier Investment Management	November 19, 2014

Comment [i-[15]: The methodology suggest t use the other tools as this research employed the secondary data and quantitative research. **Reply:** Dear, the analytical tool used in data tabulation is MRA. This model is part of a variation of the SE PLS method even though it is both operated with SmartPLS. However, MRA focuses on the role of moderating variables, while SEM-PLS is more generally aimed at mediating variables. There is a difference between mediating variables and moderating variables. The difference between mediating and moderating variables is that a mediator can be compared to an intermediary between two factors, but a moderator is an entity changes the direction or strength of the relationsh between two variables. In other words, the positio of the moderating variable is more complex than mediating variable. In the context of the studies reviewed, moderating variables are very suitable be applied to quantitative data compared to the function of mediating variables in SEM-PLS whi concentrate on qualitative data collected from surveys, interviews, etc. Additonally, SEM-PLS is also applied specifically to indicators/constructs th form variables.

14.	XISR	Reksa Dana KIK Premier ETF SRI-KEHATI	PT Indo Premier Investment Management	September 26, 2014
15.	XISI	Reksa Dana KIK Premier ETF SMinfra18	PT Indo Premier Investment Management	March 06, 2014
16.	XIJI	Reksa Dana KIK Syariah Premier ETF JII	PT Indo Premier Investment Management	April 30, 2013
17.	XIIC	Reksa Dana KIK Premier ETF Indonesia Consumer	PT Indo Premier Investment Management	April 30, 2013
18	XIIT	Reksa Dana KIK Premier IDX30	PT Indo Premier Investment Management	October 30, 2012
19.	R-ABFII	Reksa Dana KIK ABF IBI Funds	PT Bahana TCW Investment Management	December 18, 2007
20.	R-LQ45X	Reksa Dana KIK Premier LQ45	PT Indo Premier Investment Management	December 18, 2007

Source: Indonesia Stock Exchange (2023)

There are three categories developed in causality modeling (see Figure 1). First, the independent variables include expense ratio and coal price. Second, ETF fund age is set as the dependent variable. Third, the exchange rate acts as a moderating variable. Specifically for ETF fund age, the mutual fund component is a numeric type, which shows the age of each mutual fund which is calculated from the date the mutual fund was effectively traded based on a certain year.

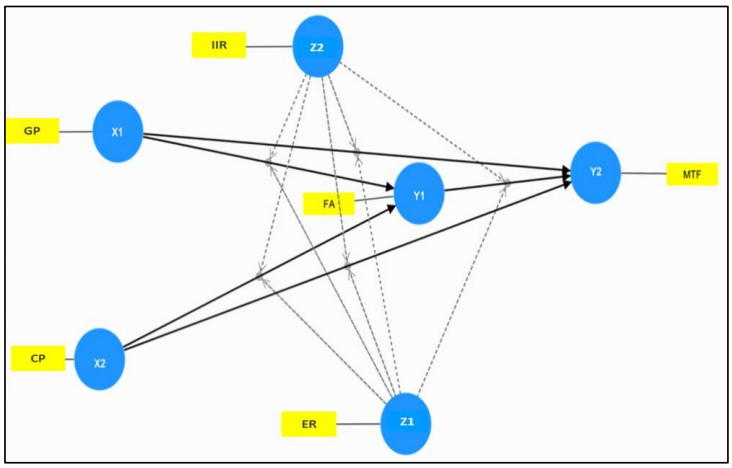

Figure 1. Proposed conceptual framework

Source: Elaborated by the authors; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The two criteria in MRA statistics include descriptive statistics and inferential statistics which are aimed at seeing the complexity of the data entity being investigated. In MRA, the moderating variable is an extension of multiple linear regression analysis (Ali & Younas, 2021; Memon et al., 2019; Woodside, 2013). Fairchild & McQuillin (2010) and Helm & Mark (2012) state that the advantages of analytical tools such as MRA can maintain the integrity of data objects and provide a basis for controlling the influence of moderator variables. Proof of hypothesis testing is operated with statistical software called SmartPLS 4. The regression equation function that adopts direct effects is created as follows:

$$Y_1 = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon_1 \quad (1)$$

$$Y_2 = \alpha_2 + \beta_3 X_1 + \beta_4 X_2 + \beta_5 Y_1 + \varepsilon_2 \quad (2)$$

Comment [i-[16]: Why the author has used Smart PLS to conduct the moderated regression analysis? What is the reason behind choosing this particular software, when more frequently used programmes like AMOS are available. This selection needs to be justified, to make the methodology stronger. **Reply:** The logical reasons behind the author using the MRA model with Sma PLS were also asked by previous reviewers. The rationale behind choosing special software (in this case Smart PLS) is explained in comment 7. Methodologically, both AMOS and SmartPLS are equally justified in the MRA approach.

Then, the moderator effect of the two variables (exchange rate and Indonesia interest rates) in the relationship between gold price and coal price on fund age and mutual fund is written below:

$$Y_1 = \alpha_3 + \beta_6 X_1 * Z_1 + \beta_7 X_2 * Z_1 + \beta_8 X_1 * Z_2 + \beta_9 X_2 * Z_2 + \varepsilon_3 \quad (3)$$

$$Y_2 = \alpha_4 + \beta_{10} X_1 * Z_1 + \beta_{11} X_2 * Z_1 + \beta_{12} Y_1 * Z_1 + \beta_{13} X_1 * Z_2 + \beta_{14} X_2 * Z_2 + \beta_{15} Y_1 * Z_2 + \varepsilon_4 \quad (4)$$

where, Y_1: Fund Age, Y_2: Mutual Fund, $\alpha_1..\alpha_4$: Constant of model, $\beta_1..\beta_{15}$: Regression coefficient, X_1: Gold Price, X_2: Coal Price, Z_1: Exchange Rate, Z_2: Indonesia Interest Rates, and $\varepsilon_1..\varepsilon_4$: Error of model.

4. RESULTS

From Table 3, consisting of 80 samples from 4 years of observation multiplied by 20 samples of ETF products, reveals an average fund age value of 5,575 with a standard deviation of 3,431, a curtosis of 1 (positive), and a skewness of 1.110 (positive). This indicates that the distribution peak is steeper than the normal distribution, and the skewness of 1.110 value indicates that the distribution tail is on the right side of the average value The average gold price of 16.41, with a standard deviation of 4,968 and a kurtosis of 4.937 (positive), shows that the distribution peaks are more steep than the regular distribution, and the skewness of -2.539 (negative) indicates the distraction tail to the left of the mean value.

Table 3. Descriptive statistics

	FA	GP	MTF	ER	IIR	CP
Mean	5,575	16,405,775	135,567,812	1,458,137.25	336,000	15,044.8
Median	5,000	17,859,000	153,056,500	1,457,226	388,500	8,876,500
Min.	1	1,701,000	12,175,000	1,431,196	4	4,942,000
Max.	15,000	19,859,000	207,799,000	1,487,061	563	43,081,000
Standard deviation	3,431	4,968,278	53,714,390	22,740,663	206,113	11,372,588
Excess kurtosis	1	4.937	1	- 1.503	-0.923	-0.246
Skewness	1.110	- 2.539	- 1.329	0	-0.704	1.051
Obs.	80	80	80	80	80	80
Cramér-von Mises test	0	3.019	1	1	1.042	1.066
Cramér-von Mises p value	0.000	0.000	0.000	0.000	0.000	0.000

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The average exchange value of 1,458,137.25 with a standard deviation of 22,740,663 and a curtosis of 1.503 (negative) indicates that the peak of the distribution is more steady than the normal distribution, as well as the skewness of 0. The data distribution tends to be symmetrical and normal-shaped. An average IIR of 336,000 with a standard deviation of 206,113 and a curtosis of -0.923, where that the distribution peak is more stable than the regular distribution, and the skewness of -0.704 indicates the distributive tail is to the left of the average value. The average coal price of 15,044,800 with a standard deviation of 11,372,588 and a curtosis of -0.246 (negative) indicates that the peak distribution is more steep than the normal distribution, and a skewness of 1.051 (positive) indicates the distribution tail is on the right side of the average value.

Table 4. Relationship between variables

Linkages	Total effects	Path coefficients	F-square	VIF
FA → MTF	0.285	0.285	0.075	1.329

Comment [i-[17]]: From the overall findings, there is no specific argument explaining the novel of the research. **Reply:** As previously commented the authors have made major corrections, includin clarifying specific arguments surrounding the novelty of the study. You can see the revised item Chapter 1 (Introduction) and Chapter 2 (Literatur Review). There are still few publications in the pa that review the relationships between the variable models that are prepared. Besides that, we found gap in the literature by unlocking variables that w not previously analyzed, for example including interest rates and exchange rates which function a moderating variables in the relationship between t independent variable and the dependent variable.

CP → FA	0.308	0.308	0.049	2.505
CP → MTF	0.143	0.055	0.001	3.723
GP → FA	0.192	0.192	0.046	1.038
GP → MTF	0.023	-0.031	0.001	1.146
ER → FA	-0.004	-0.004	0.000	1.017
ER → MTF	0.054	0.055	0.004	1.020
IIR → FA	0.295	0.295	0.030	3.816
IIR → MTF	0.187	0.103	0.003	4.428
ER x GP → FA	0.015	0.015	0.000	1.017
ER x GP → MTF	0.184	0.180	0.040	1.073
ER x FA → MTF	-0.091	-0.091	0.009	1.059
ER x CP → FA	0.056	0.056	0.004	1.052
ER x CP → MTF	-0.085	-0.101	0.012	1.058
IIR x CP → FA	1.132	1.132	0.168	3.619
IIR x CP → MTF	0.576	0.254	0.005	6.006
IIR x FA → MTF	-0.232	-0.232	0.029	1.904
IIR x GP → FA	0.180	0.180	0.024	1.090
IIR x GP → MTF	0.262	0.211	0.024	1.401

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The large size effect with the criterion F-square> 0.35 is nonexistent, as indicated by the F-square in the aforementioned table. The medium effect, with an F-square between 0.15 and 0.35, represents the influence of expense ratio on exchange rate volatility. The modest influence of expense ratio on fund age, coal price on fund age, coal price on exchange rate volatility, and fund age on exchange rate volatility is due to the fact that the value of F-square falls within the range of 0.02 to 0.15. Despite disregarding the influences, none of them have an F-square less than 0.02.

Table 5. Correlation matrix

	FA	CP	GP	MTF	ER	IIR	IIR x CP	ER x FA	ER x GP	IIR x FA	ER x CP	IIR x GP
FA	1.000	-0.025	0.147	0.291	-0.005	-0.173	0.356	-0.016	-0.011	0.175	0.034	0.104
CP	-0.025	1.000	-0.040	-0.113	0.060	-0.339	-0.327	0.035	0.031	0.233	0.183	-0.085
GP	0.147	-0.040	1.000	-0.014	0.017	0.166	-0.112	-0.011	0.030	0.090	0.032	-0.045
MTF	0.291	-0.113	-0.014	1.000	0.062	0.032	0.092	-0.046	0.156	-0.063	-0.127	0.139
ER	-0.005	0.060	0.017	0.062	1.000	-0.023	-0.044	0.008	0.020	-0.012	0.037	0.078
IIR	-0.173	-0.339	0.166	0.032	-0.023	1.000	-0.627	-0.011	0.059	-0.210	-0.026	0.233
IIR x CP	0.356	-0.327	-0.112	0.092	-0.044	-0.627	1.000	-0.040	-0.076	0.295	-0.097	-0.100
ER x FA	-0.016	0.035	-0.011	-0.046	0.008	-0.011	-0.040	1.000	0.184	-0.042	0.021	0.074
ER x GP	-0.011	0.031	0.030	0.156	0.020	0.059	-0.076	0.184	1.000	0.063	-0.075	-0.019
IIR x FA	0.175	0.233	0.090	-0.063	-0.012	-0.210	0.295	-0.042	0.063	1.000	-0.013	0.305
ER x CP	0.034	0.183	0.032	-0.127	0.037	-0.026	-0.097	0.021	-0.075	-0.013	1.000	-0.078
IIR x GP	0.104	-0.085	-0.045	0.139	0.078	0.233	-0.100	0.074	-0.019	0.305	-0.078	1.000

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

VIF should be less than 5, because values greater than 5 indicate collinearity between structures (Hair et al., 2017). In the PLS-SEM guidline, the VIF of the inner model shows how often strong correlations exist between free variables. This is also known as multicolinearity. Multicollinearity is not a concern, as there are no VIF greater than 5, as shown in Table 4. Multicolinearity is a phenomenon characterized by a high correlation

Comment [i-[18]: There is at least one VIF value >0.5 (Table 4). The implication/non-significance of this needs to be discussed. **Reply:** What is reflected in the current statistical output is the real result. We cannot make changes because t database obtained from secondary reports shows t actual empirical findings, including the VIF value Because the results of the analysis are contradicto or in line with what was expected, deeper justification is needed.

between two or more free variables or independent constructions, resulting in poor model predictability (Masmuddin et al., 2024).

Table 5 indicates that there is no significant correlation (more than 0.9 or less than -0.9) between the latent variables, thereby ruling out any issues with multicollinearity. Covariance analysis is a statistical technique that combines regression analysis and variance analysis (see Table 6). Consequently, conducting a covariate analysis necessitates testing a hypothetical condition for both regression analysis and variant analysis.

Table 6. Summary of covarians

	FA	CP	GP	MTF	ER	IIR	IIR x CP	ER x FA	ER x GP	IIR x FA	ER x CP	IIR x GP
FA	1.000	-0.025	0.147	0.291	-0.005	-0.173	-0.01	-0.01	0.03	0.21	0.16	0.08
CP	-0.025	1.000	-0.040	-0.113	0.060	-0.339	0.032	0.035	0.188	-0.197	0.215	-0.06
GP	0.147	-0.040	1.000	-0.014	0.017	0.166	0.032	-0.01	0.032	-0.068	0.083	-0.03
MTF	0.291	-0.113	-0.014	1.000	0.062	0.032	0.163	-0.04	-0.13	0.056	-0.05	0.111
ER	-0.005	0.060	0.017	0.062	1.000	-0.023	0.021	0.008	0.038	-0.026	-0.01	0.062
IIR	-0.173	-0.339	0.166	0.032	-0.023	1.000	0.062	-0.01	-0.02	-0.379	-0.19	0.186
IIR x CP	-0.011	0.032	0.032	0.163	0.021	0.062	1.097	0.192	-0.08	-0.048	0.061	-0.01
ER x FA	-0.016	0.035	-0.011	-0.045	0.008	-0.011	0.192	0.988	0.021	-0.024	-0.04	0.059
ER x GP	0.035	0.188	0.032	-0.130	0.038	-0.026	-0.081	0.021	1.053	-0.060	-0.01	-0.06
IIR x FA	0.215	-0.197	-0.068	0.056	-0.026	-0.379	-0.048	-0.02	-0.06	0.365	0.165	-0.05
ER x CP	0.162	0.215	0.083	-0.058	-0.011	-0.193	0.061	-0.03	-0.01	0.165	0.851	0.224
IIR x GP	0.083	-0.068	-0.035	0.111	0.062	0.186	-0.016	0.059	-0.06	-0.048	0.224	0.633

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The analysis of the determination coefficient leads to the following conclusions: The R-square value has a joint or simultaneous influence on the price of coal and gold, as well as the interaction with the exchange rate. For this relationship, the coefficient of determination is 0.139, with an adjusted R-square of 0.076. Therefore, all external constructions simultaneously impact on fund age, leading to a 13.9% effect. The conclusion is that the impact of all independent variables is modest, given that the adjusted R-square is below 13.9% (see Table 7). To satisfy the fit model criterion, the SMSR score should be below 0.05 (Cangur & Ercan, 2015). Basically, an SRMR of less than 0.10 or 0.08 with an NFI of greater than 0.9 is a criterion for model limitations or fit.

Table 7. Assessment of model feasibility

	R-square	R-square adjusted
FA	0.230	0.144
MTF	0.182	0.051
	Saturated model	Estimated model
SRMR	0.000	0.007
d_ULS	0.000	0.166
d_G	0.000	0.064
Chi-square	0.000	32.767
NFI	1.000	0.198
	BIC	
FA	17.423	–
MTF	35.489	–

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, MTF = Mutual Funds, SMSR = Standardized Root Mean Square, NFI = Normalized Fit Index, BIC = Bayesian

Information Criterion, d_ULS = Squared Euclidean Distance, and d_G = Geodesic Distance.

This study's probability of 0.400> 0.05 indicates that the price of coal during the 2020–2022 period does not significantly impact the fund age ETF. From Figure 1, the relationship is not significant, even if it is positive. However, if the price variable of coal is significant to the fund age ETF, it will sustain the investment in the ETF and extend its life. The SmartPLS 4 statistical process demonstrates that the interaction of interest rate and coal price influences the age rate of the fund. The probability of acquiring the value is 0.010, which is lower than the significance level of 0.05. The positive relationship indicates that coal's interest rate and price interaction can affect the fund ages ETF. The relatively low interest rate movement and the stable interaction with the fluctuating carbon price movement of carbon affect the age rate of the fund. According to the effect of exchange rate and coal price on fund age ETFs, a probability of 0.049 <0.05 indicates a significant and positive relationship. This implies that the exchange rate and coal price interaction can influence the age of the ETF. The relatively high and stable exchange-rate movement influences the fund age of the ETF, as does the fluctuating price of coal.

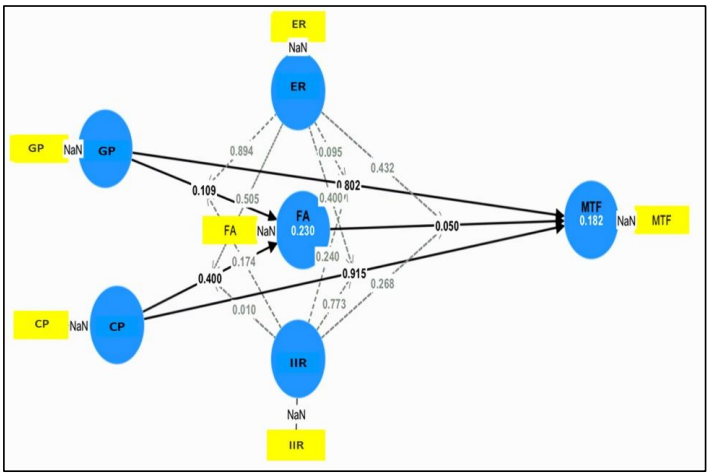

Figure 2. The link between variables

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The impact of the gold price on fund-age ETFs indicates that the period from 2020 to 2022 does not have a significant impact on fund-age ETFs. A probability of 0.109, greater than 0.05 (supports this). Additionally, an increase in the realist price movement of gold extends the investment life of the ETF, given the significant relationship between gold's price and the fund age. The influence of the interest rate and gold price on fund age ETFs shows that the probability of 0.174 is less than 0.05, indicating that the linkage is positive. There is an implication that the interaction between the interest rate and gold price does not impact the age of the ETF. Specifically, a relatively low and stable interest rate movement that interacts with a relatively rising gold price movement does not affect the ETF's age or fund age level.

The influence of the exchange value and gold price interaction on the fund age ETF is insignificant, with a probability of 0.894 <0.05. The positive relationship suggests that the exchange rate and gold price interaction does not influence the fund-age ETF. In particular, a relatively high and stable exchange value movement that interacts with fluctuating coal price movements does not affect the ETF's fund age (see Table 8).

Table 8. Path coefficients: mean, STDEV, t-statistics, and probability

Lingkages	Original sample	Sample mean	STDEV	T-statistics	Prob.
FA → MTF	0.285	0.246	0.146	1.958	0.050
CP → FA	0.308	0.462	0.365	0.842	0.400
CP → MTF	0.055	0.285	0.516	0.106	0.915
GP → FA	0.192	0.180	0.119	1.604	0.109
GP → MTF	-0.031	-0.036	0.125	0.251	0.802
ER → FA	-0.004	0.004	0.105	0.038	0.970
ER → MTF	0.055	0.060	0.109	0.510	0.610
IIR → FA	0.295	0.481	0.398	0.742	0.458
IIR → MTF	0.103	0.343	0.578	0.179	0.858
ER x GP → FA	0.015	0.007	0.113	0.133	0.894
ER x GP → MTF	0.180	0.163	0.108	1.668	0.095
ER x FA → MTF	0.156	0.154	0.184	1.967	0.049
ER x CP → FA	-0.101	-0.097	0.120	0.841	0.400
ER x CP → MTF	-0.091	-0.083	0.116	0.785	0.432
IIR x CP → FA	-0.232	-0.290	0.210	1.107	0.268
IIR x CP → MTF	0.180	0.162	0.132	1.361	0.174
IIR x FA → MTF	0.211	0.202	0.179	1.175	0.240
IIR x GP → FA	1.132	1.365	0.439	2.579	0.010
IIR x GP → MTF	0.254	0.622	0.878	0.289	0.773

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, CP = Coal Price, and STDEV = Standard Deviation.

The coal price does not significantly influence the ETF's performance during the 2020–2022 period, as indicated by the probability of 0.373> 0.05. Even though the statistical output found an insignificant effect, the relationship was positive. However, a fluctuating coal price will sustain the ETF's investment performance, and a significant correlation between the coal price variables will enhance the fund age ETF's investment performance. Based on data processing via SmartPLS 4, the probability shows 0.970> 0.05 with a positive relationship in exchange rate movements during the observation period. Unstable exchange rate movements marked by the weakening of the domestic currency (Rupiah/IDR) against the USD can affect ETF performance.

Table 9. Indirect effects: mean, STDEV, t-statistics, and probability

Lingkages	Original sample	Sample mean	STDEV	T-statistics	Prob.
CP → MTF	0.088	0.090	0.099	1.990	0.373
GP → MTF	0.055	0.044	0.043	1.259	0.208
ER → MTF	-0.001	0.000	0.030	0.038	0.970
IIR → MTF	0.084	0.099	0.112	0.749	0.454
ER x GP → MTF	0.004	0.002	0.033	0.130	0.896
ER x CP → MTF	0.016	0.014	0.026	0.623	0.533
IIR x GP → MTF	0.051	0.043	0.046	1.104	0.270
IIR x CP → MTF	0.323	0.314	0.211	1.525	0.127

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, CP = Coal Price, and STDEV = Standard Deviation.

The positive relationship between interest rate and ETF performance indicates that the probability of 0.454 <0.05 is insignificant. These findings detect that interest rate movements during the observation, the relatively low interest rate movement, the existence of decreases during pandemic periods, or the post-pandemic movement of the interest rate do not influence

the ETF's performance. In other words, the performance of such ETFs is relatively stable. The influence between the exchange rate and gold prices on ETF performance is shown by a probability of 0.896 <0.05 or in the insignificant category with a positive relationship. Therefore, with relatively high exchange rate movements, a weakening of the IDR against the USD during the pandemic, or the post-pandemic period do not influence the ETF's performance, as the exchange rate movements remain relatively stable and high, interacting with relatively low, and stable gold price movements.

Referring to Table 9 above, the influence of exchange rate and coal-price interactions on the performance of ETFs is insignificant, as evidenced by the probability of 0.533 <0.05. This positive relationship is represented by relatively high exchange rate movements, weakening of the IDR against the USD during the pandemic and post-pandemic period, and fluctuating coal prices, which do not affect the ETF's performance. The positive relationship in the interaction between interest rates and coal prices on ETF performance is shown with an insignificant probability (0.127 <0.05). This fact is shown by the shift in interest rates throughout the observations, where the movement in interest rates has decreased since the pandemic and after the pandemic which does not affect the performance of ETFs. Also, interest rates and gold prices have an insignificant effect on ETF performance as evidenced by a probability of 0.270 <0.05. In reality, although the impact is not significant, there is a positive relationship between these variables because it is triggered by inconsistent interest rate movements and affects ETF performance in the short term.

5. DISCUSSION

Comment [i-[19]: The author needs to take a relook at the discussion section. **Reply:** Yes, revis

Comment [i-[20]: Good amount of informati about the past studies related to the topic, written the discussion section, should be moved to literatu review section. The discussion section, should discuss about the findings of this study, in relation past studies. This section needs to be either relook or rephased to improve the value of the manuscrip **Reply:** Dear, once again, we thank you. Your direction regarding the amount of information abo previous studies related to the study topic written the discussion section that should be moved to the literature review section is the same as what was recommended by the first reviewer. You can revie the correction file (latest version), making it possi to evaluate whether it is relevant to the recommendation or vice versa. In the discussion section, we compare the current findings with previous studies. Therefore, the focus of the discussion section is to explore new gaps that wer not covered in past studies with the aim of increas the value of the manuscript.

The direct relationship between gold price and coal price to fund age as well as the direct relationship between gold price, coal price and fund age to mutual funds have been widely discussed by several publications in past editions. Also, indirect causality between gold price and coal price on fund age involving the role of exchange rate and interest rate or the impact of gold price, coal price and fund age in influencing mutual funds through exchange rate and interest rate has been highlighted in scientific works contained in several previous publishers.

Papers from across countries highlight direct and indirect links compared according to the relevance of the topic or model studied. First, the relationship between gold price and fund age. Fauzyah et al. (2024) and Muttaqin & Putri (2024) predict that literacy and gold price perspective have a positive effect on interest in investing in Indonesia as measured by the fund age parameter. Second, the synergy between coal price and fund age. Aziz et al. (2020) estimate that the increase in coal prices will enable an increase in the profitability of mining companies in Indonesia, while preferences from China are projected that the transmission of shocks and variations in coal prices will have a negative impact on the trading industry, especially fund age in the majority of financial institutions (Lin & Wang, 2021; Zhihua et al., 2011). Third, the connection between gold price and mutual funds. In the USA, Blose (1996) predicted that gold price elasticity brings risks to gold mutual funds, while Juwita et al. (2022) stated that there is no significant difference between the price of gold and Indonesian money market mutual funds. Fourth, the impact of coal prices on mutual funds. The price of steamed coal has a long-term impact on China's financial markets (Wen, 2023), instability such as global coal commodity prices has a spillover effect on the net asset value of mutual funds in Indonesia (Gustinanda, 2024), the increase in coal prices internationally has a significant impact statistically significant for stock returns (Ratti & Hasan, 2011), and the external factor that has a dominant influence on stock returns of coal companies in Indonesia is changes in coal export prices (Komara et al., 2019). Fifth, fund age of mutual funds. Audita et al. (2023) and Nur & Fernandika (2022) confirmed that fund age was able to increase fixed income mutual funds registered with the Indonesian OJK, while Farid & Wahba (2022) validated that fund age actually had a negative impact on mutual fund investment in Egypt.

Sixth, gold price against fund age through the exchange rate. Rahmansyah & Rani (2021) visualize that the price of gold has an insignificant effect on the price of gold shares and the USD exchange rate has a negative impact on the price of gold shares in the long term and short term for the case of PT Aneka Tambang Indonesia. On the one hand, Risman et al. (2017) revealed that the price of gold commodities which is mediated by the exchange rate (IDR/USD) can significantly influence company value. Yet, these findings are contrary to what was explained by Robiyanto (2018), where the price of gold had a negative effect on returns on the Composite Stock Price Index (IHSG) and Jakarta Islamic Index (JII) due to shifts in the BI rate and exchange rate (USD–IDR). Seventh, gold price against fund age via interest rate. Changes in gold prices relative to real interest rates and vice versa are an essential interpretation of managers in determining capital market expectations in Malaysia (Abdullah & Abu Bakar, 2015). On the object of PT Bank Mandiri Medan–Indonesia Branch, Pasaribu et al. (2021) confirms that interest rates have an insignificant effect on the amount of savings, while the price of gold contributes significantly to the amount of Third Party Funds (DPK). Eighth, coal price against fund age is moderated by the exchange rate. As is the case in Indonesia, Widati et al. (2023) proves that fund age growth is determined by international coal prices and exchange rates. Ninth, coal price against fund age which is moderated by the interest rate. The facts show that the performance of coal companies listed on IDX is inseparable from coal commodity prices that exceed limits, asset structure and interest rate policies set by Bank Indonesia (Surahman et al., 2022; Sutomo et al., 2020).

Tenth, the relevance of the gold price to mutual funds through the exchange rate. Arisandhi & Robiyanto (2022) analyzed that gold prices and exchange rates had a weak correlation with stock prices in ASEAN-5 throughout the pandemic. With a negative correlation, it indicates that the exchange rate is a safer alternative asset than gold in boosting stock prices. Besides that, Ginting & Gularso (2023) diagnosed that the exchange rate mediated by fundamental aspects such as the exchange rate can influence stock returns in telecommunications industry companies in Indonesia. Eleventh, the relevance of the gold price to mutual funds through the interest rate. Widjanarko et al. (2020) concluded that interest rates and gold prices have a negative effect on stock performance in manufacturing companies in Indonesia. Then, Shafiee & Topal (2010) tested the trend of gold price uncertainty which was influenced by investment decisions and interest rate fluctuations. Twelfth, the role of the exchange rate in the relationship between coal prices and mutual funds. Here, Churchill et al. (2019) show that the causality between coal prices and the exchange rate (USD) shows non-linearity over time and Setyani & Gunarsih (2018) illustrate that the exchange rate has a negative effect on Sharia mutual fund investment in Indonesia. Thirteenth, the role of interest rates in the relationship between coal prices and mutual funds. Variables such as interest rates and gold supply have negative risks for stock mutual fund products in Indonesia (Cheng & Dewi, 2020). Fourteenth, the function of the exchange rate in the relationship between fund age and mutual funds. According to Wijayanti et al. (2023), fund age does not have a significant effect on the performance of Indonesian mutual funds. Meanwhile, Sholeha & Fadhlillah (2023) examined that the exchange rate was proven to have no partial effect on the Net Asset Value (NAV) of Sharia mutual funds in Indonesia, while Białkowski & Otten (2011) detected that fund age adjusted for the exchange rate appeared to be less effective opportunities and advantages efficiently to the mutual fund ecosystem in a leading emerging market (in this case Poland). Fifteenth, the function of the interest rate in the relationship between fund age and mutual funds. The size and returns of funds in the US interest rate market have a broad impact on the survival capacity of mutual funds (Fabregat-Aibar et al., 2017).

6. CONCLUSION

All the correlations between the variables under consideration are shown in the first model of this study, which looks at the effects of gold, coal, interest rates, exchange rates, and the interaction between interest rates and prices. This review discovered a positive correlation between gold prices, the interaction between coal prices and exchange rates, and the interaction between gold prices and exchange rates in fund age ETF mutual funds traded on the IDX. Likewise, there is a robust positive relationship between gold prices and the age of ETF funds. This implies that the ETF's fund age may be impacted by the comparatively minor shift in gold prices during the 2020–2022 monitoring period. This positive pattern implies that the upward trend in the relatively low gold price can extend the life of the ETF investment. Additionally, the existence of positive and significant causality between ETF Fund age and ETF performance indicates that the better the ETF performance, the longer the ETF fund age traded on the IDX.

Based on the SmartPLS 4, the second model examines the direct impacts of fund age, gold prices, and coal prices on the performance of ETF mutual funds. Along with the indirect effects of coal and gold prices on ETF performance through fund age, it also examines the interaction effect of exchange rates on prices. The second model looks at the direct effects that coal prices, fund age, and gold prices have on ETF performance. It also looks at the positive but not statistically significant interaction effect of interest rates on gold, coal, and fund age on ETF performance. Only the relationship between fund age and mutual fund performance exhibits a positive and statistically significant effect; the older the fund age of an ETF, the better its performance. Finally, ETF performance can be found in the movement of its net assets; the longer an ETF has been listed on the IDX, the better its performance has been.

Although the originality and novelty of the current study provide a fresher contribution than the study in the previous edition, we realize that there are still shortcomings. Thus, the limitations of the study can become constructive insights in the next agenda by expanding knowledge of the characteristics of input variables. The urgency of developing the concept can provide a solution about the fluctuating movement of coal prices. Government policy through intervention on coal price levels is also able to encourage better ETF performance and provide flexibility for investors to maintain the life of ETF investments. The practical implications of the above scheme are expected to be able to increase the liquidity of investments traded by IDX.

Comment [i-[21]: The conclusion does not provide summary of main finding, implication and contribution. **Reply:** Findings are described based two models. First, direct causality. Second, indirect causality. Because the investigation model is operated using MRA, specific conclusions are needed to answer the proposed hypothesis. A summary of the statistical output is contained in paragraphs 1 and 2. Furthermore, contributions and implications are explained in paragraph 3. This paragraph is a new paragraph (additional revision) with the aim of revealing empirical implications, channeling policy direction, and providing understanding of decision making for sustainable investment.

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CURRENCY EXCHANGE RATE VOLATILITY AS A MODERATING EFFECT OF THE GOLD AND COAL PRICE AGAINST FUND AGE AND MUTUAL FUND IN INDONESIA

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Comment [i-[22]: That we will soon send you letter about the acceptance of your paper. The edit in-chief is asking you if you can cite some of the similar papers that were published by us in 2024. would be of great use to us.

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ABSTRACT

Shifts in gold and coal prices have a crucial impact on the macro economy, especially investment growth. On a financial scale, there is still little discussion of the relationship between gold and coal prices and stock mutual funds. Also, the role of exchange rates and interest rates in moderating this relationship has not been examined. This research reviews the performance of exchange-traded funds (ETFs) in the scope of fund age and Indonesian stock mutual funds which are influenced by gold and coal prices with the moderating effect of interest rates and exchange rates. Core data was obtained from 20 companies as mutual fund owners officially registered with the Financial Services Authority (OJK) throughout 2019–2022. By operating Moderated Regression Analysis (MRA) into SmartPLS 4, there are interactions between prices and exchange rates, prices and interest rates, and prices and gold prices. As with the relationship between the age of ETF mutual funds traded on the Indonesian Stock Exchange (IDX) and the gold price, these two variables have a strong and positive correlation. This implies that relatively small changes in gold prices over the monitoring period may impact the fund age ETF. This positive association shows that an ETF investment can have its life extended by a relatively small increase in gold prices. This research indicates a strong causality, which improves the ETF's performance on the IDX as fund age rises. Furthermore, the second model examines how fund age, gold, and coal have a direct impact on ETF mutual fund performance. It also looks closely at how indirectly coal, gold, and fund age affect ETF performance. The age of the fund, gold, coal, and exchange rates affect the performance of ETFs. While the effect is not statistically significant, interest rates, gold, coal, and fund age have a beneficial impact on ETF performance. Implications for policy makers to monitor and re-evaluate commodity price fluctuations using mining production regulation scenarios that are balanced with quality. Weaknesses of the current study such as the observation period need to be taken into consideration in future research.

Keywords: *coal price; gold price; fund age; exchange traded funds*

1. INTRODUCTION

Several nations have had challenges substituting coal with alternative energy sources in specific sectors, primarily because of its cost-effectiveness. The elasticity of coal prices increased due to the conflict between Russian with Ukraine, the leading coal producer, which restricted coal exports to other nations (van Meijl et al., 2024; Wang et al., 2022; Yagi & Managi, 2023). Coal is increasingly emerging as a significant global energy source, and fluctuations in coal prices have significantly influenced the profitability of businesses in this sector (Azis et al., 2020; Hassan et al., 2024). A robust model for forecasting coal price

indices can serve as an effective tool for firms that rely on coal consumption, enabling them to optimize their coal purchase plans and contribute to the reduction of global carbon emissions. The ETF-energy portfolio can integrate this model as a performance instrument. In certain countries, the rising interest in gold investment due to fluctuations in gold prices has led to a considerable shift from random investments to gold investments as a means of generating higher revenue.

The central bank, which controls monetary policy to maintain currency stability, is now observing a decline in interest rates and exchange rates versus the US dollar (USD). Macroeconomic factors, such as changes in interest rates and exchange rates can influence the value of the depository's fund, which in turn affects the performance of these depositories (Gerlach et al., 2018; Keshtgar et al., 2020; Kurniawan & Prajanti, 2017; Purwono et al., 2020).

Indonesia is a developing market that is famous for its wealth of mineral resources (Ascher, 2012; Hajad et al., 2023). Domestic mineral resources that can be found include oil, gold, gas and coal. Ekananda (2022) describes that the majority of macroeconomics in Indonesia rely on natural resource products which contribute to the growth of Gross Domestic Product (GDP). Primary mineral commodity trading aims to gain profits from mineral exchanges that encourage economic growth through Balance of Trade (BOT). Indonesia's energy needs are determined by the mining sector which plays a fairly large role with a contribution of 12.22% to GDP in 2022 (BPS-Statistics Indonesia, 2024).

In general, An et al. (2020), Fajarini & Darmawan (2024), Melas & Michail (2024), Putra & Robiyanto (2019), Soelistijo et al. (2015), and Zhu et al. (2023) revealed that mineral commodities have an impact on stock prices. To our knowledge, no study has explored the influence of currency exchange rate moderation on the correlation between global coal prices and the fund age ETF mutual fund shares. The goal of this project is to close these gaps. The study's design incorporated the subsequent primary research inquiries: (1) Examined the effects of various factors, including coal price, gold price, exchange rate, and interest rate interaction, exchange rate and gold price interaction, exchange rate interaction with coal rate, and the interaction of exchange rate and gold price, on the performance of fund age ETFs traded on the IDX; and (2) Explores the immediate impact of coal price, gold price, and fund age on the ETF group's performance. The findings also examined the indirect relationships between coal and gold prices, taking into account the impact of the fund's age on an ETF's performance. Furthermore, it investigated the effect of exchange value interactions on coal and gold prices, as well as the fund's age. It also examined the impact of interest rate interactions on coal and gold prices, as well as the fund's age, on the ETF's performance.

The initial and subsequent models analyze the influence of coal and gold prices on the assets of the Indonesian nation, necessitating proficient administration to attract investors in particular industries. The government uses interest rate and exchange value as a policy tool to maintain macroeconomic stability, especially in specific industries (Li et al., 2021). This paper identifies the relationship between interest rate and coal interaction and price, interest rate and gold interaction, exchange value and price of coal, interaction of exchange values, and gold price with fund age ETFs traded on the IDX. Investors may gain confidence when they observe a fund's age of investment increasing, since they interpret this as an indication of a higher investment value (Bai et al., 2019; Joshi & Sebastian, 2022; Nguyen et al., 2018; Saleem et al., 2021).

By looking at the above phenomenon, the current study is designed to identify the impact of two essential commodity prices in the world, i.e gold and coal on fund age and mutual funds which are bridging by exchange rates and interest rates. The insights in this new study are focused not only on linking gold prices and coal prices to fund age and mutual funds, but are also varied by including the role of exchange rates and tribes in the relationship between the

two commodities to push fund age and mutual funds in a positive direction. The benefits of the analysis output make it possible to solve problems in the future, which makes it easier for investors to plan buying and selling transactions for ETF products in the hope of getting convenience, transparent information, diversification, affordable capital and liquidity. Also, the usefulness of the study is a consideration for banks in determining interest rates to stimulate exchange rate stability.

2. LITERATURE REVIEW

Comment [i-[23]: First Reviewer: In the second round, there are some matters to be revised: (1) Use the standard punctuation ma in your work; (2) Discuss your work based on the findings of the research; (3) Discuss secti in a focused and clear manner' and (4) Attach your sample list-or and others in an open dat file.

The investment management selected stocks to optimize the value of the ETF portfolio (Anuno et al., 2024; Oliinyk & Kozmenko, 2019). The volatility of coal prices affects the worth of the retailer's portfolio by controlling their performance, which is influenced by the movement of coal prices. Due to the calm movement of exchange rates, the massive Russian invasion of Ukraine triggered a dynamic movement in commodity prices (Chen et al., 2023; Maurya et al., 2023). Investors expect fund age, a key measure of factors influencing ETF performance to assist in developing more efficient ETF portfolios and to assist fund providers in enhancing the quality of their offerings (Tripathi & Sethi, 2022). Kasongwa & Minja (2022) explains that the influence of interest rate and exchange value interactions on coal and gold prices moderately improves ETF market performance. Differences in size and volume between ETFs and their underlying portfolios, based on fund age and pricing errors, explain ETF performance gaps, which fundamentally vary cross-sectionally over time (Pham et al., 2021).

The movement of exchange rate interactions at fund age influences the gaps in the performance of ETFs. An increase in currency exchange rates indicates their interaction at the volume and size of fund age, thereby minimizing the impact of pricing errors on ETF performance. This is because transactions involving coal and gold between countries require stable exchange rate movements (Setiawanta et al., 2020). Global risk factors, primarily associated with the volatility of coal and gold prices, significantly restrict the ability to independently implement monetary policy through interest rate and exchange rate lines, thereby enhancing the performance of ETF markets and negatively impacting real economic growth (Aloui et al., 2018; Alsubaiei et al., 2024; Sanderson & Lumpkin-Sowers, 2018). The supply and demand of the USD, along with value fluctuations, consistently influence the value of gold. The purchasing power of people, impacted by various conditions or economic conditions, influences the value of the USD and subsequently the price of gold.

In the context of currency exchange rates, a depressed USD relative to other currencies will lead to a surge in demand for US commodities, particularly gold, given their valuation in USD. As a result, the price of gold will rise. When the value of the USD decreases, people in countries with a different currency can buy or invest in US gold at a lower price. This is due to the fact that the value of gold in USD decreases, thereby making it more affordable. As a result, individuals with other currencies must pay a higher price to purchase gold from the US, and in some cases, they may not be able to afford to purchase it at all. This decrease in demand for gold has resulted in a fall in its price (Al-Ameer et al., 2018; Arisandhi & Robiyanto, 2022; Betancur-Corredor et al., 2018; Hendro et al., 2020). The price of gold changed as the stock market collapsed (Al-Ameer et al., 2018; Mensi et al., 2013; Padungsaksawasdi, 2020). As a result, gold investors' sentiment in relation to expected gold price movements can flow into the stock market, causing contagious effects. If the gold investor carries the same information as the equity investor, the stock market activity will respond to the change in that gold investor.

The economy is experiencing a persistent appreciation of currency exchange rates, accompanied by substantial volatility over time. Inflation rates, interest rates, political

instability, economic performance, and external debt typically determine the volatility of the currency exchange rate, which ultimately affects the number of investors in the stock markets (Ghauri et al., 2024; Hendro et al., 2020; Setiawanta et al., 2020; Zubair & Aladejare, 2017). Indonesia's important role as an exporter of coal bricks has a significant impact on exchange rates. This encourages us to do research on the exchange rate and price of coal in Indonesia (Chandrarin et al., 2022). The reverse correlation between currency exchange rates and coal prices suggests that the Indonesian currency is rising in value relative to the USD. The empirical conclusions we have drawn have important implications for the central bank authorities in their efforts to control the exchange rate by optimizing the value of coal benefits through exchange-rate lines.

Interest rates are among the monetary tools used for economic intervention (Christou et al., 2020; Umoru & Hussaini, 2022). In addition to interest rate swings, stock market performance indicators also have an impact on investors' decisions regarding the performance of the unofficial sector of the market. According to research, interest rates initially have a beneficial impact on investment growth but subsequently start to exert negative pressure on rises in investment (Serikkyzy et al., 2024).

So far, fund age determined by commodity prices (gold and coal) compared by Akhmadi et al. (2023) and Zufa & Prasetyo (2023). In fact, market timing in gold stocks is crucial to the life of a mutual fund. In essence, gold stocks have a relatively high risk for mutual fund investment. But, increasingly expensive global energy prices such as coal have a significant impact on the Indonesian stock index (Yasri & Anas, 2023). The relevance of commodity prices (gold and coal) and fund age to mutual funds is also tested. In this context, Gwilym et al. (2011) and Shabbir et al. (2020) argue that the specialization of gold prices can provide explanatory power to future stock markets. It can also be understood about the effect of coal prices on mutual funds, where mutual funds in energy equity are triggered by more systemic market movements (Malhotra & Nippani, 2024). Marti-Ballester (2019) stated that the price of conventional energy (including coal) is an integration in mutual fund investment decisions. In short, equity mutual funds still depend on coal trading even though decarbonization movements are being carried out by some companies as an effort to reduce carbon emissions (Rohleder et al., 2022). Moreover, the correlation between fund age and mutual funds is positive. This was revealed by Fajrinda et al. (2022), Hada & Suri (2020), and Rachmayanti et al. (2023) that fund age can improve mutual fund performance.

In the scientific space, the connection in fund age and mutual fund mechanisms formed by trends in gold and coal prices through interest rates and exchange rates has never been analyzed. In fact, interest rates and exchange rates are monetary policies. In principle, this policy is a scheme that can control and at least be an initial parameter for investors in seeing patterns in fund age and mutual funds which at any time can experience shifts according to the dynamics of gold and coal prices. The terminology about the role of interest rates and exchange rates in the role of coal and gold prices on fund age and mutual funds opens up academic and theoretical gaps, making it ideal for follow-up. To develop the position and function of each study variable, study hypotheses that can be built are as follows:

H_1 and H_2: The increase in gold prices and coal prices can increase fund age.

H_3: Gold prices are able to grow mutual fund funds.

H_4: Coal prices are able to grow mutual fund funds.

H_5: Fund age are able to grow mutual fund funds.

H_6, H_7, H_8, and H_9: Gold prices and coal prices, which are moderated by interest rates and exchange rates, have an impact on fund age.

H_{10}, H_{11}, H_{12}, H_{13}, H_{14}, and H_{15}: Developments in gold prices, coal prices, and fund ages which are moderated by interest rates and exchange rates can have an impact on mutual funds

Comment [i-[24]: Second Reviewer: The authors have either made suitable changes or provided suitable justification for their views. Hence, I believe that the article in its current form covers all aspects and adds value to the existing literature.
However, the authors need to take a relook at the following two points: (1) First statement in Literature Review (highlighted in yellow). This statement needs to be either rephrased or rewritten; and (2) H3, H4 & H5 related statement on Page 4, Paragraph 4. This statement needs to be relooked at and rephrased.

Comment [i-[25]: The point 2 mentioned in m last mail (which needs to change) is not changed o adjusted or justified. The information related to th Hypotheses 3,4 & 5 is given in the following form

H3, H4, and H5: Gold prices, coal prices, and fun age are able to grow fund age. According to this hypotheses, Fund Age is used as both predictor variable and outcome variable (gold prices, coal prices, and fund age are able to grow fund age). T is not possible and this needs to change. These thr hypotheses needs to be written separately. Withou being written separately, it fails to make any meaning.

3. METHOD AND MATERIALS

This study was designed with a quantitative approach. Quantitative data is collected based on secondary reports from the finances of mutual funds classified as ETFs. The population used in this research is mutual fund ETFs registered in the Financial Services Authority (OJK) from 2019 to 2022 which comprises 51 companies. In determining sampling, the author uses non probability samplings, one of which is purposive. Regarding the consideration or criteria set by the mutual fund ETFs to represent its population, as shown in Table 1 below.

Table 1. Sampling criteria

No.	Detail of samples	Number of companies
1.	From 2020 to 2022, ETFs listed on the IDX	51
2.	ETFs that were not listed on the IDX between 2020 and 2022	(1)
3.	The ETFs have incomplete data from 2020 to 2022	(30)
Number of samples that meet the criteria		20
Observation period		4 years
Obs.		80

Source: Indonesia Stock Exchange (2023)

From Table 1, the data material that matches the criteria amounts to 20 sample companies. The list of companies for the tabulation process can be tracked at https://www.idx.co.id/id/data-pasar/data-exchanged-traded-fund-etf. Table 2 displays the twenty matching samples used for data compilation. The interaction test, also known as Moderated Regression Analysis (MRA), serves as the data analysis technique in this study. Also, MRA was applied to support hypothesis testing.

Table 2. Sample list of ETFs in 2019 and 2022

No.	ETF code	ETF	Investment manager	Decision date
1.	XIPI	Reksa Dana Indeks Premier ETF PEFINDO i-Grade	PT Indo Premier Investment Management	December 21, 2018
2.	XIHD	Reksadana Indeks Premier ETF IDX HIGH DIVIDEN 20	PT Indo Premier Investment Management	December 18, 2018
3.	XPFT	Reksa Dana Pinnacle FTSE Indonesia	PT Pinnacle Persada Investama	September 10, 2018
4.	XBNI	Reksa Dana Indeks BNI-AM Nusantara ETF MSCI Indone	PT BNI Asset Management	May 23, 2018
5.	XDIF	Reksa Dana Danareks ETF Indonesia Top 40	PT Danareksa Investment Management	April 23, 2018
6.	XBLQ	Reksa Dana Batavia Smart Liquid ETF	PT Batavia Prosperindo Aset Manajemen	April 10, 2018
7.	XPSG	Reksa Dana Pinnacle Indonesia ESG ETF	PT Pinnacle Persada Investama	February 02, 2018
8.	XPES	Reksa Dana Pinnacle Enhanced Sharia ETF	PT Pinnacle Persada Investama	October 12, 2017
9.	XPDV	Reksa Dana Pinncale Core High Dividend ETF	PT Pinnacle Persada Investama	June 09, 2017
10.	XISB	Premier ETF Indonesia Sovereign Bonds	PT Indo Premier Investment Management	February 02, 2017
11.	XPLQ	Reksa Dana Pinacle Enhanced Liquid ETF	PT Pinnacle Persada Investama	August 15, 2016
12.	XISC	Premier ETF Indonesia State-Owned Companies	PT Indo Premier Investment Management	October 01, 2015
13.	XIIF	Reksa Dana Premier ETF	PT Indo Premier	November 19,

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		Indonesia Financial	Investment Management	2014
14.	XISR	Reksa Dana KIK Premier ETF SRI-KEHATI	PT Indo Premier Investment Management	September 26, 2014
15.	XISI	Reksa Dana KIK Premier ETF SMinfra18	PT Indo Premier Investment Management	March 06, 2014
16.	XIJI	Reksa Dana KIK Syariah Premier ETF JII	PT Indo Premier Investment Management	April 30, 2013
17.	XIIC	Reksa Dana KIK Premier ETF Indonesia Consumer	PT Indo Premier Investment Management	April 30, 2013
18	XIIT	Reksa Dana KIK Premier IDX30	PT Indo Premier Investment Management	October 30, 2012
19.	R-ABFII	Reksa Dana KIK ABF IBI Funds	PT Bahana TCW Investment Management	December 18, 2007
20.	R-LQ45X	Reksa Dana KIK Premier LQ45	PT Indo Premier Investment Management	December 18, 2007

Source: Indonesia Stock Exchange (2023)

There are three categories developed in causality modeling (see Figure 1). First, the independent variables include expense ratio and coal price. Second, ETF fund age is set as the dependent variable. Third, the exchange rate acts as a moderating variable. Specifically for ETF fund age, the mutual fund component is a numeric type, which shows the age of each mutual fund which is calculated from the date the mutual fund was effectively traded based on a certain year. Operationally, each variable has articulation with different measurements. First, fund age describes the effective period since the mutual fund was established and traded (Hadaa & Suri, 2020; Howell, 2021; Morey, 2002). Second, Azis et al. (2022) defines a mutual fund as an investment program that collects funds from investors to invest in financial instruments such as money markets, bonds and shares. Third, the definition of the gold price is the value of supply and demand which is determined by money in purchasing gold (Elfakhani et al., 2009; Shafiee & Topal, 2010). Fourth, the coal price is the value agreed between sellers and buyers of coal commodities which is determined by the quality of the coal using benchmark prices and reference prices (Tiwari et al., 2015). Fifth, the exchange rate is the price of one unit of foreign currency converted into domestic currency and vice versa (Emikönel et al., 2023; Kočenda & Moravcová, 2019; Panda & Mohanty, 2015; Setiawanta et al., 2020). Sixth, Oxford Analytica (2024) states that Indonesia's interest rate is a policy that reflects the monetary policy attitude or stance set by Bank Indonesia and announced to the public.

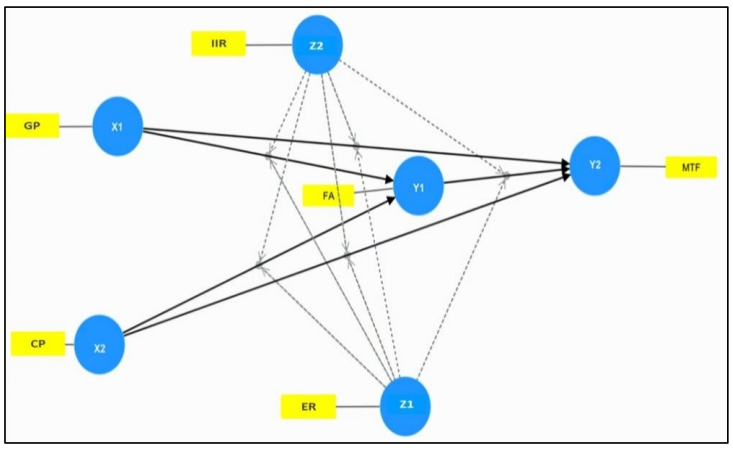

Figure 1. Proposed conceptual framework

Comment [i-[27]: What are the measurement the research variables (research methodology)?.

Source: Elaborated by the authors; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The two criteria in MRA statistics include descriptive statistics and inferential statistics which are aimed at seeing the complexity of the data entity being investigated. In MRA, the moderating variable is an extension of multiple linear regression analysis (Ali & Younas, 2021; Memon et al., 2019; Woodside, 2013). Fairchild & McQuillin (2010) and Helm & Mark (2012) state that the advantages of analytical tools such as MRA can maintain the integrity of data objects and provide a basis for controlling the influence of moderator variables. Proof of hypothesis testing is operated with statistical software called SmartPLS 4. The regression equation function that adopts direct effects is created as follows:

$$Y_1 = \alpha_1 + \beta_1 X_1 + \beta_2 X_2 + \varepsilon_1 \quad (1)$$

$$Y_2 = \alpha_2 + \beta_3 X_1 + \beta_4 X_2 + \beta_5 Y_1 + \varepsilon_2 \quad (2)$$

Then, the moderator effect of the two variables (exchange rate and Indonesia interest rates) in the relationship between gold price and coal price on fund age and mutual fund is written below:

$$Y_1 = \alpha_3 + \beta_6 X_1 * Z_1 + \beta_7 X_2 * Z_1 + \beta_8 X_1 * Z_2 + \beta_9 X_2 * Z_2 + \varepsilon_3 \quad (3)$$

$$Y_2 = \alpha_4 + \beta_{10} X_1 * Z_1 + \beta_{11} X_2 * Z_1 + \beta_{12} Y_1 * Z_1 + \beta_{13} X_1 * Z_2 + \beta_{14} X_2 * Z_2 + \beta_{15} Y_1 * Z_2 + \varepsilon_4 \quad (4)$$

where, Y_1: Fund Age, Y_2: Mutual Fund, $\alpha_1..\alpha_4$: Constant of model, $\beta_1..\beta_{15}$: Regression coefficient, X_1: Gold Price, X_2: Coal Price, Z_1: Exchange Rate, Z_2: Indonesia Interest Rates, and $\varepsilon_1..\varepsilon_4$: Error of model.

4. RESULTS

From Table 3, consisting of 80 samples from 4 years of observation multiplied by 20 samples of ETF products, reveals an average fund age value of 5,575 with a standard deviation of 3,431, a curtosis of 1 (positive), and a skewness of 1.110 (positive). This indicates that the distribution peak is steeper than the normal distribution, and the skewness of 1.110 value indicates that the distribution tail is on the right side of the average value The average gold price of 16.41, with a standard deviation of 4,968 and a kurtosis of 4.937 (positive), shows that the distribution peaks are more steep than the regular distribution, and the skewness of -2.539 (negative) indicates the distraction tail to the left of the mean value.

Table 3. Descriptive statistics

	FA	GP	MTF	ER	IIR	CP
Mean	5,575	16,405,775	135,567,812	1,458,137.25	336,000	15,044.8
Median	5,000	17,859,000	153,056,500	1,457,226	388,500	8,876,500
Min.	1	1,701,000	12,175,000	1,431,196	4	4,942,000
Max.	15,000	19,859,000	207,799,000	1,487,061	563	43,081,000
Standard deviation	3,431	4,968,278	53,714,390	22,740,663	206,113	11,372,588
Excess kurtosis	1	4.937	1	- 1.503	-0.923	-0.246
Skewness	1.110	- 2.539	- 1.329	0	-0.704	1.051
Obs.	80	80	80	80	80	80
Cramér-von Mises test	0	3.019	1	1	1.042	1.066
Cramér-von Mises p value	0.000	0.000	0.000	0.000	0.000	0.000

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The average exchange value of 1,458,137.25 with a standard deviation of 22,740,663 and a curtosis of 1.503 (negative) indicates that the peak of the distribution is more steady than the normal distribution, as well as the skewness of 0. The data distribution tends to be symmetrical and normal-shaped. An average IIR of 336,000 with a standard deviation of 206,113 and a curtosis of -0.923, where that the distribution peak is more stable than the regular distribution, and the skewness of -0.704 indicates the distributive tail is to the left of the average value. The average coal price of 15,044,800 with a standard deviation of 11,372,588 and a curtosis of -0.246 (negative) indicates that the peak distribution is more steep than the normal distribution, and a skewness of 1.051 (positive) indicates the distribution tail is on the right side of the average value.

Table 4. Relationship between variables

Linkages	Total effects	Path coefficients	F-square	VIF
FA to MTF	0.285	0.285	0.075	1.329
CP to FA	0.308	0.308	0.049	2.505
CP to MTF	0.143	0.055	0.001	3.723
GP to FA	0.192	0.192	0.046	1.038
GP to MTF	0.023	-0.031	0.001	1.146
ER to FA	-0.004	-0.004	0.000	1.017
ER to MTF	0.054	0.055	0.004	1.020
IIR to FA	0.295	0.295	0.030	3.816
IIR to MTF	0.187	0.103	0.003	4.428
ER & GP to FA	0.015	0.015	0.000	1.017
ER & GP to MTF	0.184	0.180	0.040	1.073
ER & FA to MTF	-0.091	-0.091	0.009	1.059
ER & CP to FA	0.056	0.056	0.004	1.052
ER & CP to MTF	-0.085	-0.101	0.012	1.058
IIR & CP to FA	1.132	1.132	0.168	3.619
IIR & CP to MTF	0.576	0.254	0.005	6.006
IIR & FA to MTF	-0.232	-0.232	0.029	1.904
IIR & GP to FA	0.180	0.180	0.024	1.090
IIR & GP to MTF	0.262	0.211	0.024	1.401

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

Comment [i-[28]: For the second round, there are some matters to be revised (the latest requirements)
Use the standard punctuation marks in your work adequate.

The large size effect with the criterion F-square> 0.35 is nonexistent, as indicated by the F-square in the aforementioned table. The medium effect, with an F-square between 0.15 and 0.35, represents the influence of expense ratio on exchange rate volatility. The modest influence of expense ratio on fund age, coal price on fund age, coal price on exchange rate volatility, and fund age on exchange rate volatility is due to the fact that the value of F-square falls within the range of 0.02 to 0.15. Despite disregarding the influences, none of them have an F-square less than 0.02.

Table 5. Correlation matrix

	FA	CP	GP	MTF	ER	IIR	IIR & CP	ER & FA	ER & GP	IIR & FA	ER & CP	IIR & GP
FA	1.000	-0.025	0.147	0.291	-0.005	-0.173	0.356	-0.016	-0.011	0.175	0.034	0.104
CP	-0.025	1.000	-0.040	-0.113	0.060	-0.339	-0.327	0.035	0.031	0.233	0.183	-0.085
GP	0.147	-0.040	1.000	-0.014	0.017	0.166	-0.112	-0.011	0.030	0.090	0.032	-0.045
MTF	0.291	-0.113	-0.014	1.000	0.062	0.032	0.092	-0.046	0.156	-0.063	-0.127	0.139
ER	-0.005	0.060	0.017	0.062	1.000	-0.023	-0.044	0.008	0.020	-0.012	0.037	0.078
IIR	-0.173	-0.339	0.166	0.032	-0.023	1.000	-0.627	-0.011	0.059	-0.210	-0.026	0.233
IIR & CP	0.356	-0.327	-0.112	0.092	-0.044	-0.627	1.000	-0.040	-0.076	0.295	-0.097	-0.100
ER & FA	-0.016	0.035	-0.011	-0.046	0.008	-0.011	-0.040	1.000	0.184	-0.042	0.021	0.074
ER &	-0.011	0.031	0.030	0.156	0.020	0.059	-0.076	0.184	1.000	0.063	-0.075	-0.019

GP												
IIR & FA	0.175	0.233	0.090	-0.063	-0.012	-0.210	0.295	-0.042	0.063	1.000	-0.013	0.305
ER & CP	0.034	0.183	0.032	-0.127	0.037	-0.026	-0.097	0.021	-0.075	-0.013	1.000	-0.078
IIR & GP	0.104	-0.085	-0.045	0.139	0.078	0.233	-0.100	0.074	-0.019	0.305	-0.078	1.000

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

VIF should be less than 5, because values greater than 5 indicate collinearity between structures (Hair et al., 2017). In the PLS-SEM guidline, the VIF of the inner model shows how often strong correlations exist between free variables. This is also known as multicolinearity. Multicollinearity is not a concern, as there are no VIF greater than 5, as shown in Table 4. Multicolinearity is a phenomenon characterized by a high correlation between two or more free variables or independent constructions, resulting in poor model predictability (Masmuddin et al., 2024).

Table 5 indicates that there is no significant correlation (more than 0.9 or less than -0.9) between the latent variables, thereby ruling out any issues with multicollinearity. Covariance analysis is a statistical technique that combines regression analysis and variance analysis (see Table 6). Consequently, conducting a covariate analysis necessitates testing a hypothetical condition for both regression analysis and variant analysis.

Table 6. Summary of covarians

	FA	CP	GP	MTF	ER	IIR	IIR & CP	ER & FA	ER & GP	IIR & FA	ER & CP	IIR & GP
FA	1.000	-0.025	0.147	0.291	-0.005	-0.173	-0.01	-0.01	0.03	0.21	0.16	0.08
CP	-0.025	1.000	-0.040	-0.113	0.060	-0.339	0.032	0.035	0.188	-0.197	0.215	-0.06
GP	0.147	-0.040	1.000	-0.014	0.017	0.166	0.032	-0.01	0.032	-0.068	0.083	-0.03
MTF	0.291	-0.113	-0.014	1.000	0.062	0.032	0.163	-0.04	-0.13	0.056	-0.05	0.111
ER	-0.005	0.060	0.017	0.062	1.000	-0.023	0.021	0.008	0.038	-0.026	-0.01	0.062
IIR	-0.173	-0.339	0.166	0.032	-0.023	1.000	0.062	-0.01	-0.02	-0.379	-0.19	0.186
IIR & CP	-0.011	0.032	0.032	0.163	0.021	0.062	1.097	0.192	-0.08	-0.048	0.061	-0.01
ER & FA	-0.016	0.035	-0.011	-0.045	0.008	-0.011	0.192	0.988	0.021	-0.024	-0.04	0.059
ER & GP	0.035	0.188	0.032	-0.130	0.038	-0.026	-0.081	0.021	1.053	-0.060	-0.01	-0.06
IIR & FA	0.215	-0.197	-0.068	0.056	-0.026	-0.379	-0.048	-0.02	-0.06	0.365	0.165	-0.05
ER & CP	0.162	0.215	0.083	-0.058	-0.011	-0.193	0.061	-0.03	-0.01	0.165	0.851	0.224
IIR & GP	0.083	-0.068	-0.035	0.111	0.062	0.186	-0.016	0.059	-0.06	-0.048	0.224	0.633

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The analysis of the determination coefficient leads to the following conclusions: The R-square value has a joint or simultaneous influence on the price of coal and gold, as well as the interaction with the exchange rate. For this relationship, the coefficient of determination is 0.139, with an adjusted R-square of 0.076. Therefore, all external constructions simultaneously impact on fund age, leading to a 13.9% effect. The conclusion is that the impact of all independent variables is modest, given that the adjusted R-square is below 13.9% (see Table 7). To satisfy the fit model criterion, the SMSR score should be below 0.05 (Cangur & Ercan, 2015). Basically, an SRMR of less than 0.10 or 0.08 with an NFI of greater than 0.9 is a criterion for model limitations or fit.

Table 7. Assessment of model feasibility

	R-square	R-square adjusted
FA	0.230	0.144
MTF	0.182	0.051
	Saturated model	Estimated model
SRMR	0.000	0.007
d_ULS	0.000	0.166
d_G	0.000	0.064
Chi-square	0.000	32.767
NFI	1.000	0.198
	BIC	
FA	17.423	–
MTF	35.489	–

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, MTF = Mutual Funds, SMSR = Standardized Root Mean Square, NFI = Normalized Fit Index, BIC = Bayesian Information Criterion, d_ULS = Squared Euclidean Distance, and d_G = Geodesic Distance.

This study's probability of 0.400> 0.05 indicates that the price of coal during the 2020–2022 period does not significantly impact the fund age ETF. From Figure 1, the relationship is not significant, even if it is positive. However, if the price variable of coal is significant to the fund age ETF, it will sustain the investment in the ETF and extend its life. The SmartPLS 4 statistical process demonstrates that the interaction of interest rate and coal price influences the age rate of the fund. The probability of acquiring the value is 0.010, which is lower than the significance level of 0.05. The positive relationship indicates that coal's interest rate and price interaction can affect the fund ages ETF. The relatively low interest rate movement and the stable interaction with the fluctuating carbon price movement of carbon affect the age rate of the fund. According to the effect of exchange rate and coal price on fund age ETFs, a probability of 0.049 <0.05 indicates a significant and positive relationship. This implies that the exchange rate and coal price interaction can influence the age of the ETF. The relatively high and stable exchange-rate movement influences the fund age of the ETF, as does the fluctuating price of coal.

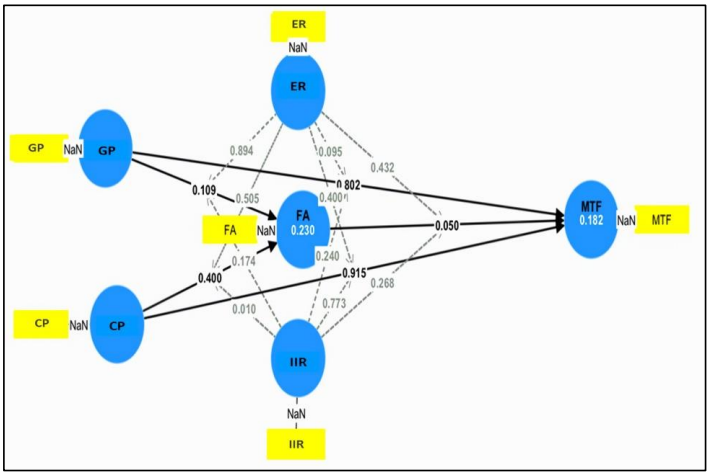

Figure 2. The link between variables

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, and CP = Coal Price.

The impact of the gold price on fund-age ETFs indicates that the period from 2020 to 2022 does not have a significant impact on fund-age ETFs. A probability of 0.109, greater than 0.05

(supports this). Additionally, an increase in the realist price movement of gold extends the investment life of the ETF, given the significant relationship between gold's price and the fund age. The influence of the interest rate and gold price on fund age ETFs shows that the probability of 0.174 is less than 0.05, indicating that the linkage is positive. There is an implication that the interaction between the interest rate and gold price does not impact the age of the ETF. Specifically, a relatively low and stable interest rate movement that interacts with a relatively rising gold price movement does not affect the ETF's age or fund age level.

The influence of the exchange value and gold price interaction on the fund age ETF is insignificant, with a probability of 0.894 <0.05. The positive relationship suggests that the exchange rate and gold price interaction does not influence the fund-age ETF. In particular, a relatively high and stable exchange value movement that interacts with fluctuating coal price movements does not affect the ETF's fund age (see Table 8).

Table 8. Path coefficients: mean, STDEV, t-statistics, and probability

Lingkages	Original sample	Sample mean	STDEV	T-statistics	Prob.
FA to MTF	0.285	0.246	0.146	1.958	0.050
CP to FA	0.308	0.462	0.365	0.842	0.400
CP to MTF	0.055	0.285	0.516	0.106	0.915
GP to FA	0.192	0.180	0.119	1.604	0.109
GP to MTF	-0.031	-0.036	0.125	0.251	0.802
ER to FA	-0.004	0.004	0.105	0.038	0.970
ER to MTF	0.055	0.060	0.109	0.510	0.610
IIR to FA	0.295	0.481	0.398	0.742	0.458
IIR to MTF	0.103	0.343	0.578	0.179	0.858
ER & GP to FA	0.015	0.007	0.113	0.133	0.894
ER & GP to MTF	0.180	0.163	0.108	1.668	0.095
ER & FA to MTF	0.156	0.154	0.184	1.967	0.049
ER & CP to FA	-0.101	-0.097	0.120	0.841	0.400
ER & CP to MTF	-0.091	-0.083	0.116	0.785	0.432
IIR & CP to FA	-0.232	-0.290	0.210	1.107	0.268
IIR & CP to MTF	0.180	0.162	0.132	1.361	0.174
IIR & FA to MTF	0.211	0.202	0.179	1.175	0.240
IIR & GP to FA	1.132	1.365	0.439	2.579	0.010
IIR & GP to MTF	0.254	0.622	0.878	0.289	0.773

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, CP = Coal Price, and STDEV = Standard Deviation.

The coal price does not significantly influence the ETF's performance during the 2020–2022 period, as indicated by the probability of 0.373> 0.05. Even though the statistical output found an insignificant effect, the relationship was positive. However, a fluctuating coal price will sustain the ETF's investment performance, and a significant correlation between the coal price variables will enhance the fund age ETF's investment performance. Based on data processing via SmartPLS 4, the probability shows 0.970> 0.05 with a positive relationship in exchange rate movements during the observation period. Unstable exchange rate movements marked by the weakening of the domestic currency (Rupiah/IDR) against the USD can affect ETF performance.

The positive relationship between interest rate and ETF performance indicates that the probability of 0.454 <0.05 is insignificant. These findings detect that interest rate movements during the observation, the relatively low interest rate movement, the existence of decreases during pandemic periods, or the post-pandemic movement of the interest rate do not influence the ETF's performance. In other words, the performance of such ETFs is relatively stable. The

influence between the exchange rate and gold prices on ETF performance is shown by a probability of 0.896 <0.05 or in the insignificant category with a positive relationship. Therefore, with relatively high exchange rate movements, a weakening of the IDR against the USD during the pandemic, or the post-pandemic period do not influence the ETF's performance, as the exchange rate movements remain relatively stable and high, interacting with relatively low, and stable gold price movements.

Table 9. Indirect effects: mean, STDEV, t-statistics, and probability

Lingkages	Original sample	Sample mean	STDEV	T-statistics	Prob.
CP to MTF	0.088	0.090	0.099	1.990	0.373
GP to MTF	0.055	0.044	0.043	1.259	0.208
ER to MTF	-0.001	0.000	0.030	0.038	0.970
IIR to MTF	0.084	0.099	0.112	0.749	0.454
ER & GP to MTF	0.004	0.002	0.033	0.130	0.896
ER & CP to MTF	0.016	0.014	0.026	0.623	0.533
IIR & GP to MTF	0.051	0.043	0.046	1.104	0.270
IIR & CP to MTF	0.323	0.314	0.211	1.525	0.127

Source: Computed with SmartPLS 4; **Abbreviations:** FA = Fund Age, GP = Gold Price, MTF = Mutual Funds, ER = Exchange Rate, IIR = Indonesia Interest Rates, CP = Coal Price, and STDEV = Standard Deviation.

Referring to Table 9 above, the influence of exchange rate and coal-price interactions on the performance of ETFs is insignificant, as evidenced by the probability of 0.533 <0.05. This positive relationship is represented by relatively high exchange rate movements, weakening of the IDR against the USD during the pandemic and post-pandemic period, and fluctuating coal prices, which do not affect the ETF's performance. The positive relationship in the interaction between interest rates and coal prices on ETF performance is shown with an insignificant probability (0.127 <0.05). This fact is shown by the shift in interest rates throughout the observations, where the movement in interest rates has decreased since the pandemic and after the pandemic which does not affect the performance of ETFs. Also, interest rates and gold prices have an insignificant effect on ETF performance as evidenced by a probability of 0.270 <0.05. In reality, although the impact is not significant, there is a positive relationship between these variables because it is triggered by inconsistent interest rate movements and affects ETF performance in the short term.

5. DISCUSSION

Comment [i-[29]: Discuss your work based o the research findings (discuss section) focused an clear manner.

Empirically, a positive correlation was found from the proposed model. In contrast, there is negative causality between the variables tested throughout 2019 and 2022. The direct relationship between gold price and coal price to fund age as well as the direct relationship between gold price, coal price and fund age to mutual funds have been widely discussed by several publications in past editions. Also, indirect causality between gold price and coal price on fund age involving the role of exchange rate and interest rate or the impact of gold price, coal price and fund age in influencing mutual funds through exchange rate and interest rate has been highlighted in scientific works contained in several previous publishers.

Papers from across countries highlight direct and indirect links compared according to the relevance of the topic or model studied. First, the relationship between gold price and fund age. Fauzyah et al. (2024) and Muttaqin & Putri (2024) predict that literacy and gold price perspective have a positive effect on interest in investing in Indonesia as measured by the fund age parameter. Second, the synergy between coal price and fund age. Aziz et al. (2020) estimate that the increase in coal prices will enable an increase in the profitability of mining companies in Indonesia, while preferences from China are projected that the transmission of shocks and variations in coal prices will have a negative impact on the trading industry,

especially fund age in the majority of financial institutions (Lin & Wang, 2021; Zhihua et al., 2011). Third, the connection between gold price and mutual funds. In the USA, Blose (1996) predicted that gold price elasticity brings risks to gold mutual funds, while Juwita et al. (2022) stated that there is no significant difference between the price of gold and Indonesian money market mutual funds. Fourth, the impact of coal prices on mutual funds. The price of steamed coal has a long-term impact on China's financial markets (Wen, 2023), instability such as global coal commodity prices has a spillover effect on the net asset value of mutual funds in Indonesia (Gustinanda, 2024), the increase in coal prices internationally has a significant impact statistically significant for stock returns (Ratti & Hasan, 2011), and the external factor that has a dominant influence on stock returns of coal companies in Indonesia is changes in coal export prices (Komara et al., 2019). Fifth, fund age of mutual funds. Audita et al. (2023) and Nur & Fernandika (2022) confirmed that fund age was able to increase fixed income mutual funds registered with the Indonesian OJK, while Farid & Wahba (2022) validated that fund age actually had a negative impact on mutual fund investment in Egypt.

Sixth, gold price against fund age through the exchange rate. Rahmansyah & Rani (2021) visualize that the price of gold has an insignificant effect on the price of gold shares and the USD exchange rate has a negative impact on the price of gold shares in the long term and short term for the case of PT Aneka Tambang Indonesia. On the one hand, Risman et al. (2017) revealed that the price of gold commodities which is mediated by the exchange rate (IDR/USD) can significantly influence company value. Yet, these findings are contrary to what was explained by Robiyanto (2018), where the price of gold had a negative effect on returns on the Composite Stock Price Index (IHSG) and Jakarta Islamic Index (JII) due to shifts in the BI rate and exchange rate (USD–IDR). Seventh, gold price against fund age via interest rate. Changes in gold prices relative to real interest rates and vice versa are an essential interpretation of managers in determining capital market expectations in Malaysia (Abdullah & Abu Bakar, 2015). On the object of PT Bank Mandiri Medan–Indonesia Branch, Pasaribu et al. (2021) confirms that interest rates have an insignificant effect on the amount of savings, while the price of gold contributes significantly to the amount of Third Party Funds (DPK). Eighth, coal price against fund age is moderated by the exchange rate. As is the case in Indonesia, Widati et al. (2023) proves that fund age growth is determined by international coal prices and exchange rates. Ninth, coal price against fund age which is moderated by the interest rate. The facts show that the performance of coal companies listed on IDX is inseparable from coal commodity prices that exceed limits, asset structure and interest rate policies set by Bank Indonesia (Surahman et al., 2022; Sutomo et al., 2020).

Tenth, the relevance of the gold price to mutual funds through the exchange rate. Arisandhi & Robiyanto (2022) analyzed that gold prices and exchange rates had a weak correlation with stock prices in ASEAN-5 throughout the pandemic. With a negative correlation, it indicates that the exchange rate is a safer alternative asset than gold in boosting stock prices. Besides that, Ginting & Gularso (2023) diagnosed that the exchange rate mediated by fundamental aspects such as the exchange rate can influence stock returns in telecommunications industry companies in Indonesia. Eleventh, the relevance of the gold price to mutual funds through the interest rate. Widjanarko et al. (2020) concluded that interest rates and gold prices have a negative effect on stock performance in manufacturing companies in Indonesia. Then, Shafiee & Topal (2010) tested the trend of gold price uncertainty which was influenced by investment decisions and interest rate fluctuations. Twelfth, the role of the exchange rate in the relationship between coal prices and mutual funds. Here, Churchill et al. (2019) show that the causality between coal prices and the exchange rate (USD) shows non-linearity over time and Setyani & Gunarsih (2018) illustrate that the exchange rate has a negative effect on Sharia mutual fund investment in Indonesia. Thirteenth, the role of interest rates in the relationship between coal prices and mutual funds. Variables such as interest rates and gold supply have

negative risks for stock mutual fund products in Indonesia (Cheng & Dewi, 2020). Fourteenth, the function of the exchange rate in the relationship between fund age and mutual funds. According to Wijayanti et al. (2023), fund age does not have a significant effect on the performance of Indonesian mutual funds. Meanwhile, Sholeha & Fadhlillah (2023) examined that the exchange rate was proven to have no partial effect on the Net Asset Value (NAV) of Sharia mutual funds in Indonesia, while Białkowski & Otten (2011) detected that fund age adjusted for the exchange rate appeared to be less effective opportunities and advantages efficiently to the mutual fund ecosystem in a leading emerging market (in this case Poland). Fifteenth, the function of the interest rate in the relationship between fund age and mutual funds. The size and returns of funds in the US interest rate market have a broad impact on the survival capacity of mutual funds (Fabregat-Aibar et al., 2017).

6. CONCLUSION

All the correlations between the variables under consideration are shown in the first model of this study, which looks at the effects of gold, coal, interest rates, exchange rates, and the interaction between interest rates and prices. This review discovered a positive correlation between gold prices, the interaction between coal prices and exchange rates, and the interaction between gold prices and exchange rates in fund age ETF mutual funds traded on the IDX. Likewise, there is a robust positive relationship between gold prices and the age of ETF funds. This implies that the ETF's fund age may be impacted by the comparatively minor shift in gold prices during the 2020–2022 monitoring period. This positive pattern implies that the upward trend in the relatively low gold price can extend the life of the ETF investment. Additionally, the existence of positive and significant causality between ETF Fund age and ETF performance indicates that the better the ETF performance, the longer the ETF fund age traded on the IDX.

Based on the SmartPLS 4, the second model examines the direct impacts of fund age, gold prices, and coal prices on the performance of ETF mutual funds. Along with the indirect effects of coal and gold prices on ETF performance through fund age, it also examines the interaction effect of exchange rates on prices. The second model looks at the direct effects that coal prices, fund age, and gold prices have on ETF performance. It also looks at the positive but not statistically significant interaction effect of interest rates on gold, coal, and fund age on ETF performance. Only the relationship between fund age and mutual fund performance exhibits a positive and statistically significant effect; the older the fund age of an ETF, the better its performance. Finally, ETF performance can be found in the movement of its net assets; the longer an ETF has been listed on the IDX, the better its performance has been.

Although the originality and novelty of the current study provide a fresher contribution than the study in the previous edition, we realize that there are still shortcomings. Thus, the limitations of the study can become constructive insights in the next agenda by expanding knowledge of the characteristics of input variables. The urgency of developing the concept can provide a solution about the fluctuating movement of coal prices. Government policy through intervention on coal price levels is also able to encourage better ETF performance and provide flexibility for investors to maintain the life of ETF investments. The practical implications of the above scheme are expected to be able to increase the liquidity of investments traded by IDX.

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