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CONTENTS

PEDAGOGY

Aitimbaev A., Issayev M., Apendiyev T. Scientific and methodological opportunities for using archival materials in teaching the history of Kazakhstan in higher education institutions.....	19
Akhmetova G., Kabdusheva A., Mussina A. A quantitative study on university students' academic writing challenges and learning needs.....	40
Akhmetova Zh.A., Nurgali S., Nurmetova D. Pedagogical foundations of using digital resources in teaching academic writing.....	57
Bekbolat Zh., Zholmakhanova A., Yildirim S. Theoretical foundations of teaching M. Shokai's letters through a research-based approach.....	72
Berdenkulova A.Zh., Zhandavletova R.B., Nazarova G.A. A pedagogical model for improving educational quality through the "comfortable school - society - university" partnership.....	88
Duisenova G., Shyndaliyev N., Shadiyev R. Comparative analysis of traditional and virtualized programming education.....	104
Yeskendiroya A., Kassenova N., Nogoyev Y. Comparative analysis of texts created by AI and texts developed using quantization technology.....	121
Zhanysbekova Sh., Nurmakhanova Zh., Akasheva A. Actual problems of the formation of pragmatic competence: research based on the results of content analysis.....	136
Zulpykhar Zh.E., Kapanova D.E., Zhilmagambetova R.Z. Modern resources and technologies as a foundation for the development of teachers' professional competencies.....	153
Isaeva A., Ananyeva S. Axiological interpretation of the Kazakhstan theme in the works of K. Paustovsky: methodological approaches to teaching at the university.....	172
Kabzhalelov K.R., Korganbayeva Zh.K., Nurakhmetova A.R. Developing critical thinking through modern chatbots in chemistry education.....	190
Kazhenova Zh.S., Kydyralina L.M., Rakhmatullina Z.T. Problems of developing students' engineering skills.....	208

Kaldarova A., Vasquez M., Kulgildinova T. Developing students' profession-oriented speaking skills through ChatGPT.....	229
Kapbarova G.Sh., Gundogdu A., Baidalieva E.A. History teaching methodology: theoretical and practical foundations of the competency-based approach.....	243
Kozhakhanova L., Amirova A. Prospects for developing media literacy among primary school students.....	260
Kuzhagulova G., Sydykova R., Smailova M Features of education of national values in visually impaired students through Kazakh lyric songs.....	278
Markhmadova Zh.K., Kassymova G.K., Okenova B. Pedagogical aspects of developing and assessing the digital competence of pedagogy-psychologists.....	297
Mateyeva M., Yeralin K., Burkitbaev T. Training future teachers of artistic work for art-historical regional studies.....	318
Makhanov N., Nishanova K. Development of students' cognitive competencies through museum-based education: evidence from South Kazakhstan.....	333
Myrzagereikyzy G., Yermekova Zh.K., Aldzhambekova G.T. The use of action research in preparing future physics teachers for the development of functional literacy of students.....	348
Reginbayeva N., Nametkulova F. Methodological foundations of professionally-oriented physics education based on STEM education for future air transport specialists.....	365
Serikbayeva N., Orynbekova A., Tuyakova U. Methodology for developing digital competence of educational psychologists in modern education.....	385
Toiganbekova M.E., Kazhigalieva G.A. Aspects of creation and specification of educational texts for increasing the effectiveness of training.....	409
Shegebayeva G., Zhumasheva T., Nurbekova S. Prerequisites for the preparation of future educators for the creation of a health-educational environment based on nutriscology.....	422
Shishov S.E., Iovbak A.S., Verko Y.A. Integrated modular physics experiment as a means of organizing students' experimental activities in secondary school.....	443

ECONOMICS

Abdimoldayeva A., Madysheva A., Zhunussova G. Transformation of logistics cost accounting in the agro-industrial complex under digitalization.....	461
Abuova Zh., Duiskenova R., Kadyrbekova D. The concept of sustainable development of the hotel business based on digital transformation and environmental management.....	479
Amantay Mukhit, Kanabekova M., Oralbayeva Zh. Digitalization as a driver of Kazakhstan's economic growth: econometric analysis and structural effects.....	494
Ashim N., Dzhrauova K., Kushenova M. Improving the management of agricultural subsidies: Kyzylorda region.....	511
Assemova R., Abdibekov S., Aitbayeva D. Energy efficiency and innovation in agriculture: empirical evidence from Southern Kazakhstan.....	535
Assanova Zh., Baimukhanova S., Konysbaeva G. Environmental accounting, ESG reporting and digitalization: impact on cost reduction and sustainable development.....	554
Baigelova A., Sadykova Zh., Epanchintseva S. Industrial economy transformation in Kazakhstan: structural shifts, digitalization and productivity growth.....	571
Beisekova Zh., Mutaliyeva A., Kunshigarova L. Transformation of entrepreneurial activity in Kazakhstan in 2000–2025.....	590
Beisenbayeva A., Kambarov B., Samenova N. Development of small and medium-sized enterprises in Almaty: ecosystem factors and structural dynamics.....	611
Bekisheva A., Beketova K., Dorohova N. Human resource management practices and employee perceptions in Kazakhstan's civil service.....	629
Bissenbayeva S., Kireyeva A., Zhumaxanova K. Digitalization, government support and innovation activity: evidence from regional analysis in Kazakhstan.....	646
Em O.L., Kim D. Features of risk management in collective investment.....	665

Ibrayeva A., Kenesheva G., Arynova Zh. Qualification mismatch in the labour market of an industrial region: a conceptual model and measurement mechanism.....	684
Juman J., Mukhtarova K.S., Liao Z. The modern model of China's economic cooperation with Central Asian countries.....	701
Karakulova A., Bakirbekova A., Zhangirova R. Improving the efficiency of digital transformation of agricultural enterprises: an empirical analysis of Kostanay region.....	718
Kuralbayeva A.Sh., Issayeva G.K., Zhussipova E.E. Energy-saving technologies in irrigated agriculture of Southern Kazakhstan: economic and environmental effects.....	734
Naimanova Zh., Bakirbekova A., Kuralbayeva R. Digital inequality and agricultural productivity: evidence from Southern Kazakhstan....	749
Nartbayeva A., Dadabayeva D., Altuntas G. Economic resilience of single-industry towns in Kazakhstan: a dynamic analysis of socio-economic indicators.....	767
Nurlanuly A., Petrovčiková K., Shalbolova U.Zh. Comparative analysis of aviation market development models in Kazakhstan and Slovakia.....	785
Nyshanbayeva U., Moldashbayeva L., Urazbayeva Z. Accounting and valuation of investment projects in digital tourism: an integrated approach.....	801
Shegir G., Kerimova U., Kabi Sh. The transition of the agro-industrial complex of the Almaty region to the production of value-added products.....	819
Shiganbayeva N., Razakova D., Orlowska R. Trade turnover between China and Kazakhstan in the context of contemporary analytical studies: factors, challenges, and risks.....	840
Tuzubekova M., Zhunusova A., Kadirova N. Analysis of SME support incentives in the manufacturing industry of the Republic of Kazakhstan.....	857
Yeraliyeva Ya., Ruziyeva E., Alimbekova B. Trend and structure of research on digital financial literacy: bibliometric approach.....	877
Zhassan G., Taibek Zh., Imanova G. Climate risk management in the banking sector: ESG-based global and Kazakhstani experience.....	891

МАЗМҰНЫ

ПЕДАГОГИКА

Айтимбаев А.Т., Исаев М.С., Апендиев Т.А. Қазақстан тарихын жоғары оқу орындарында оқытуда архив материалдарын пайдаланудың ғылыми-әдістемелік мүмкіндіктері (1920–1950 жж. Оңтүстік Қазақстандағы саяси қуғын-сүргін құрбандары тағдырлары негізінде).....	19
Ахметова Г.С., Кабдушева А.Б., Мусина А.Б. Университет студенттерінің академиялық жазылымдағы қиындықтары мен оқу қажеттіліктеріне арналған сандық зерттеу.....	40
Ахметова Ж.А., Нұрғали С., Нурметова Д. Академиялық жазуды оқытуда сандық ресурстарды пайдаланудың педагогикалық негіздері.....	57
Бекболат Ж.Н., Жолмаханова А.Б., Сейфуллах Йылдырым Мұстафа Шоқай хаттарын зерттеушілік әдіс арқылы оқытудың теориялық негіздері.....	72
Берденкулова А.Ж., Жандавлетова Р.Б., Назарова Г.А. «Жайлы мектеп – қоғам – университет» серіктестігі негізінде білім сапасын арттырудың педагогикалық моделі.....	88
Ескендірова А.А., Касенова Н.Б., Ногоев Ю.Я. ЖИ арқылы жасалған мәтіндер мен кванттау технологиясы арқылы әзірленген мәтіндердің салыстырмалы талдауы.....	104
Жанысбекова Ш., Нурмаханова Ж., Акашева Ә. Прагматикалық құзіреттілікті қалыптастырудың өзекті мәселелері: контент-анализ нәтижелері бойынша зерттеу.....	121
Дүйсенова Г.А., Шындалиев Н.Т., Шадиев Р.Н. Дәстүрлі және виртуалды бағдарламалау білімінің салыстырмалы талдауы.....	136
Зулпыхар Ж.Е., Капанова Д.Е., Жилмагамбетова Р.З. Педагогтердің кәсіби құзыреттілігін дамытудың негізі ретінде қазіргі заманғы ресурстар мен технологиялар.....	153
Исаева А.А., Ананьева С.В. К. Паустовский шығармашылығындағы Қазақстан тақырыбының аксиологиялық интерпретациясы: жоғары оқу орнында оқытудың әдіснамалық тәсілдері.....	172
Кабжалелов К.Р., Қорғанбаева Ж.Қ., Нурахметова А.Р. Химияны оқыту барысында заманауи чат-боттар арқылы сыни ойлауды дамыту.....	190

Каженова Ж.С., Қыдыралина Л.М., Рахматулина З.Т. Оқушылардың инженерлік дағдыларын дамыту мәселелері.....	208
Калдарова А.К., Васкес М.А., Кульгильдинова Т.А. Студенттердің кәсіби-бағдарланған айтылым дағдыларын ChatGPT арқылы дамыту.....	229
Капбарова Г.Ш., Гюндогду А., Байдалиева Э.А. Тарихты оқыту әдістемесі: құзыреттілікке негізделген тәсілді қолданудың теориялық және практикалық негіздері.....	243
Кожыханова Л., Амирова А. Бастауыш сынып оқушыларының медиасауаттылығын дамыту перспективалары.....	260
Кужагулова Г.Е., Сыдыкова Р.Ш., Смаилова М.С. Көру қабілеті бұзылған білім алушыларды қазақтың лирикалық әндері арқылы ұлттық құндылықтарға тәрбиелеудің ерекшеліктері.....	278
Мархмадова Ж.Қ., Касымова Г.К., Өкенова Б. Педагог-психологтың цифрлық құзыреттілігін қалыптастыру және бағалаудың педагогикалық аспектілері.....	297
Матеева М.А., Ералин Қ., Буркитбаев Т. Болашақ көркем еңбек мұғалімдерін өнертанымдық өлкетануға даярлау.....	318
Маханов Н., Нишанова К. Музейлік білім беру негізінде оқушылардың танымдық құзыреттіліктерін дамыту (Оңтүстік Қазақстан мысалында).....	333
Мырзагерейқызы Г., Еркемова Ж.К., Алджамбекова Г.Т. Болашақ физика мұғалімдерін оқушылардың функционалдық сауаттылығын дамытуға даярлауда action research пайдалану.....	348
Регинбаева Н.А., Наметкулова Ф.Д. Болашақ әуе транспорты мамандарына физиканы STEM білім беру негізінде кәсіби-бағдарлы оқытудың әдістемелік негіздері.....	365
Серикбаева Н.Б., Орынбекова А.С., Туякова У.Ж. Қазіргі білім беруде педагог-психологтардың цифрлық құзыреттілігін дамыту әдістемесі.....	385
Тойғанбекова М.Е., Қажығалиева Г.А. Оқытудың тиімділігін арттыру үшін оқу мәтіндерін құру және нақтылау аспектілері.....	409

Шегебаева Г.У., Жумашева Т.С., Нурбекова С.М.

Болашақ тәрбиешілерді нутрициология негізінде денсаулық сақтау-білім беру ортасын құруға дайындаудың алғышарттары.....422

Шишов С.Е., Иовбак А.С., Верко Е.А.

Орта мектепте оқушылардың эксперименталдық қызметін ұйымдастыру құралы ретінде интеграцияланған модульді физика эксперименті.....443

ЭКОНОМИКА**Абдимолдаева А., Мадышева А., Жунусова Г.**

Цифрландыру жағдайында агроөнеркәсіптік кешендегі логистикалық шығындар есебін қайта құру.....461

Абуова Ж., Дүйсеннова Р., Кадырбекова Д.

Цифрлық трансформация және экологиялық басқару негізіндегі қонақ үй бизнесінің тұрақты даму тұжырымдамасы.....479

Әшім Н., Джрауова К., Кушенова М.

Ауылшаруашылығы субсидияларын басқаруды жетілдіру: Қызылорда облысы...494.

Мұхит Амантай, Кенабекова М., Оралбаева Ж.

Цифрландыру Қазақстанның экономикалық өсуінің драйвері ретінде: эконометрикалық талдау және құрылымдық әсерлер.....511

Асемова Р., Абдибеков С., Айтбаева Д.

Ауылшаруашылығындағы энергия тиімділігі және инновациялар: Оңтүстік Қазақстан бойынша эмпирикалық дәлелдер.....535

Асанова Ж., Баймуханова С., Қонысбаева Г.

Экологиялық есеп, ESG-есептілік және цифрландыру: шығындарды төмендетуге және орнықты дамуға әсері.....554

Байгелова А., Садыкова Ж., Епанчинцева С.

Қазақстандағы өнеркәсіп экономикасының трансформациясы: құрылымдық өзгерістер, цифрландыру және өнімділіктің өсуі.....571

Бейсекова Ж., Муталиева А., Куншигарова Л.

2000–2025 жылдары Қазақстандағы кәсіпкерлік қызметтің трансформациясы.....590

Бейсенбаева А., Қамбаров Б., Саменова Н.

Алматыда шағын және орта кәсіпкерлікті дамыту: экожүйелік факторлар және құрылымдық динамика.....611

Бекишева А., Бекетова К., Дорохова Н.

Қазақстанның мемлекеттік қызметіндегі адам ресурстарын басқару тәжірибелері және қызметкерлердің қабылдауы.....629

Бисенбаева С., Киреева А., Жұмаксанова К.

Цифрландыру, мемлекеттік қолдау және инновациялық белсенділік:
Қазақстан өңірлерінің талдауы.....646

Эм О.Л., Ким Д.

Ұжымдық инвестициялардағы тәуекелдерді басқарудың ерекшеліктері.....665

Ибраева А., Кенешева Г., Арынова Ж.

Өнеркәсіптік өңірдің еңбек нарығындағы біліктілік сәйкессіздігі:
тұжырымдамалық модель және өлшеу тетігі.....684

Жұман Ж., Мұхтарова К.С., Ляо Чжан

Қытайдың Орталық Азия елдерімен экономикалық ынтымақтастығының
заманауи моделі.....701

Қаракұлова А., Бакирбекова А., Жангирова Р.

Ауыл шаруашылығы кәсіпорындарының цифрлық трансформациясының
тиімділігін арттыру: Қостанай облысының эмпирикалық талдауы.....718

Құралбаева А.Ш., Исаева Г.К., Жусипова Э.Е.

Оңтүстік Қазақстанның суармалы ауыл шаруашылығындағы энергия үнемдеу
технологиялары: экономикалық және экологиялық тиімділік.....734

Найманова Ж., Бакирбекова А., Құралбаева Р.

Цифрлық теңсіздік және ауыл шаруашылығының өнімділігі:
Оңтүстік Қазақстан деректері.....749

Нартбаева А., Дадабаева Д., Алтунташ Г.

Қазақстан моноқалаларының экономикалық резиленттілігі: әлеуметтік-
экономикалық көрсеткіштердің динамикалық талдауы.....767

Нұрланұлы А., Петровчикова К., Шалболова У.Ж.

Қазақстан мен Словакияның авиациялық нарықтарының даму модельдерін
салыстырмалы талдау.....785

Нышанбаева Ұ., Молдашбаева Л., Уразбаева З.

Цифрлық туризмдегі инвестициялық жобаларды есепке алу және бағалау:
интеграцияланған тәсіл.....801

Шегір Г., Керимова У., Қаби Ш.

Алматы облысының агроөнеркәсіптік кешенінің қосылған құны бар өнім
өндіруге көшуі.....819

Шиганбаева Н., Разакова Д., Орловска Р.

Қытай мен Қазақстан арасындағы тауар айналымы: факторлар, мәселелер
және тәуекелдер.....840

- Тузубекова М., Жунусова А., Кадирова Н.**
Қазақстан Республикасының өңдеу өнеркәсібіндегі шағын және орта бизнесті
ынталандыруды талдау.....857
- Ералиева Я., Рузиева Э., Алимбекова Б.**
Цифрлық қаржылық сауаттылық бойынша зерттеулердің тенденциялары
мен құрылымы: библиометриялық тәсіл.....877
- Жасан Г.Ж., Тайбек Ж.Қ., Иманова Г.А.**
Банк секторындағы климаттық тәуекелдерді басқару: ESG негізіндегі әлемдік
және қазақстандық тәжірибе.....891

СОДЕРЖАНИЕ

ПЕДАГОГИКА

Айтимбаев А.Т., Исаев М.С., Апендиев Т.А.

Научно-методические возможности использования архивных материалов при преподавании истории Казахстана в высших учебных заведениях (на примере судеб жертв политических репрессий в Южном Казахстане в 1920–1950 гг.).....19

Ахметова Г.С., Кабдушева А.Б., Мусина А.Б.

Количественное исследование проблем академического письма и образовательных потребностей студентов университета.....40

Ахметова Ж.А., Нурғали С., Нурметова Д.

Педагогические основы использования цифровых ресурсов в обучении академическому письму.....57

Бекболат Ж.Н., Жолмаханова А.Б., Сейфуллах Йылдырым

Теоретические основы обучения письмам М. Шокая исследовательским методом.....72

Берденкулова А.Ж., Жандавлетова Р.Б., Назарова Г.А.

Педагогическая модель повышения качества образования на основе партнёрства «комфортная школа – общество – университет».....88

Дуйсенова Г.А., Шындалиев Н.Т., Шадиев Р.Н.

Сравнительный анализ традиционного и виртуализированного обучения программированию.....104

Ескендирова А.А., Касенова Н.Б., Ногоев Ю.Я.

Сравнительный анализ текстов, созданных ИИ и текстов, разработанных с помощью технологии квантования.....121

Жанысбекова Ш., Нурмаханова Ж., Акашева А.

Актуальные проблемы формирования прагматической компетенции: исследование по результатам контент-анализа.....136

Зулпыхар Ж.Е., Капанова Д.Е., Жилмагамбетова Р.З.

Современные ресурсы и технологии как основа развития профессиональных компетенций педагогов.....153

Исаева А.А., Ананьева С.В.

Аксиологическая интерпретация казахстанской тематики в творчестве К. Паустовского: методологические подходы к преподаванию в вузе.....172

Кабжалелов К.Р., Корганбаева Ж.К., Нурахметова А.Р. Развитие критического мышления с помощью современных чат-ботов при обучении химии.....	190
Каженова Ж.С., Кыдыралина Л.М., Рахматуллина З.Т. Проблемы развития инженерных навыков учащихся.....	208
Калдарова А.К., Васкез М.А., Кульгильдинова Т.А. Развитие профессионально ориентированных навыков устной речи студентов с использованием ChatGPT.....	229
Капбарова Г.Ш., Гюндогду А., Байдалиева Э.А. Методика преподавания истории: теоретические и практические основы применения компетентностного подхода.....	243
Кожыханова Л., Амирова А. Перспективы развития медиаграмотности среди учащихся начальной школы.....	260
Кужагулова Г.Е., Сыдыкова Р.Ш., Смаилова М.С. Особенности воспитания национальных ценностей у слабовидящих обучающихся через казахские лирические песни.....	278
Мархмадова Ж.К., Касымова Г.К., Окенова Б. Педагогические аспекты формирования и оценки цифровой компетентности педагогов-психологов.....	297
Матеева М.А., Ералин К., Буркитбаев Т. Подготовка будущих учителей художественного труда к искусствоведческому краеведению.....	318
Маханов Н., Нишанова К. Развитие познавательных компетенций учащихся на основе музейного образования (на примере Южного Казахстана).....	333
Мырзагерейкызы Г., Еркекова Ж.К., Алджамбекова Г.Т. Использование action research в подготовке будущих учителей физики к развитию функциональной грамотности учащихся.....	348
Регинбаева Н.А., Наметкулова Ф.Д. Методические основы профессионально-ориентированного обучения физике на основе STEM образования для будущих специалистов воздушного транспорта.....	365
Серикбаева Н.Б., Орынбекова А.С., Туякова У.Ж. Методика развития цифровой компетентности педагогов-психологов в современном образовании.....	385

Тойганбекова М.Е., Кажигалиева Г.А.

Аспекты создания и спецификации учебных текстов для повышения эффективности обучения.....409

Шегебаева Г.У., Жумашева Т.С., Нурбекова С.М.

Предпосылки подготовки будущих воспитателей к созданию здоровьесберегающей образовательной среды на основе нутрициологии.....422

Шишов С.Е., Иовбак А.С., Верко Е.А.

Интегрированный модульный физический эксперимент как средство организации экспериментальной деятельности учащихся в средней школе.....443

ЭКОНОМИКА**Абдимолдаева А., Мадышева А., Жунусова Г.**

Трансформация учета логистических затрат в агропромышленном комплексе в условиях цифровизации.....461

Абуова Ж., Дуйскенова Р., Кадырбекова Д.

Концепция устойчивого развития гостиничного бизнеса на основе цифровой трансформации и экологического менеджмента.....479

Ашим Н., Джрауова К., Кушенова М.

Совершенствование управления агросубсидиями: Кызылординская область.....494

Мухит Амантай, Канабекова М., Оралбаева Ж.

Цифровизация как драйвер экономического роста Казахстана: эконометрический анализ и структурные эффекты.....511

Асемова Р., Абдибеков С., Айтбаева Д.

Энергоэффективность и инновации в сельском хозяйстве: эмпирические данные Южного Казахстана.....535

Асанова Ж., Баймуханова С., Конысбаева Г.

Экологический учет, ESG-отчетность и цифровизация: влияние на снижение издержек и устойчивое развитие.....554

Байгелова А., Садыкова Ж., Епанчинцева С.

Трансформация промышленной экономики Казахстана: структурные сдвиги, цифровизация и рост производительности.....571

Бейсекова Ж., Муталиева А., Куншигарова Л.

Трансформация предпринимательской деятельности в Казахстане в 2000–2025 годах.....590

Бейсенбаева А., Камбаров Б., Саменова Н. Развитие малого и среднего предпринимательства в Алматы: экосистемные факторы и структурная динамика.....	611
Бекишева А., Бекетова К., Дорохова Н. Практики управления человеческими ресурсами и восприятие сотрудников в государственной службе Казахстана.....	629
Бисенбаева С., Киреева А., Жумаксанова К. Цифровизация, государственная поддержка и инновационная активность: региональный анализ Казахстана.....	646
Эм О.Л., Ким Д. Особенности управления рисками в сфере коллективных инвестиций.....	665
Ибраева А., Кенешева Г., Арынова Ж. Несоответствие квалификации на рынке труда промышленного региона: концептуальная модель и механизм измерения.....	684
Жуман Ж., Мухтарова К.С., Ляо Чжан Современная модель экономического сотрудничества Китая со странами Центральной Азии.....	701
Каракулова А., Бакирбекова А., Жангирова Р. Повышение эффективности цифровой трансформации сельскохозяйственных предприятий: эмпирический анализ Костанайской области.....	718
Куралбаева А.Ш., Исаева Г.К., Жусипова Э.Е. Энергосберегающие технологии в орошаемом сельском хозяйстве Южного Казахстана: экономические и экологические эффекты.....	734
Найманова Ж., Бакирбекова А., Куралбаева Р. Цифровое неравенство и продуктивность сельского хозяйства: данные из Южного Казахстана.....	749
Нартбаева А., Дадабаева Д., Алтунташ Г. Экономическая резилиентность моногородов Казахстана: динамический анализ социально-экономических показателей.....	767
Нурланулы А., Петровчикова К., Шалболова У.Ж. Сравнительный анализ моделей развития авиационных рынков Казахстана и Словакии.....	785
Нышанбаева У., Молдашбаева Л., Уразбаева З. Учет и оценка инвестиционных проектов в цифровом туризме: интегрированный подход.....	801

Шегир Г., Керимова У., Каби Ш.

Переход агропромышленного комплекса Алматинской области к производству продукции с добавленной стоимостью.....819

Шиганбаева Н., Разакова Д., Орловска Р.

Товарооборот Китая и Казахстана: факторы, проблемы и риски.....840

Тузубекова М., Жунусова А., Кадирова Н.

Анализ стимулирования малого и среднего бизнеса в обрабатывающей промышленности Республики Казахстан.....857

Ералиева Я., Рузиева Э., Алимбекова Б.

Тенденции и структура исследований цифровой финансовой грамотности: библиометрический подход.....877

Жасан Г.Ж., Тайбек Ж.Қ., Иманова Г.А.

Управление климатическими рисками в банковском секторе: стандарты ESG в мировом и казахстанском опыте.....891

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FEATURES OF RISK MANAGEMENT IN COLLECTIVE INVESTMENT

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Abstract. It is therefore becoming increasingly important to outline how to manage collective investment risks given the complexities of international markets. To achieve the objective of this work, an analysis will be conducted on how macroeconomic instability, market volatility, and geopolitical risks affect collective investment funds, with particular reference to risk indicators such as exchange rates, inflation levels, interest rates, and political risks. In light of this, econometric tools, including an ARDL methodology, Granger causality, Impulse Response Functions (IRFs), and Variance Decomposition Analysis (VDA), identified the long-run co-relationships between macroeconomic fluctuations and investment portfolios. According to the research evidence, market risk, interest rate risk, exchange rate risk, and inflation risk decrease risk-adjusted investment returns, providing evidence for their role as significant financial risks. Conversely, while GDP growth and political stability enhance investment resilience, they mitigate the negative impacts of global volatility. Based on Granger causality tests, it is evident that market risk, changes in interest rates, and exchange rate changes are highly significant in determining collective investment risk, indicating the impact of monetary policies and global financial conditions on investment outcomes. Thus, there is a need for ongoing risk management strategies, including portfolio diversification, dynamic hedging, regulatory compliance, and the application of financial technologies to monitor risk in real time. These findings are helpful to investment fund managers, policymakers, and financial regulators

by highlighting appropriate measures that could be adopted to improve financial stability and protect investors from volatility in the global financial market.

Keywords: collective investment, risk management, global turbulence, market volatility, portfolio diversification, financial stability

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ҰЖЫМДЫҚ ИНВЕСТИЦИЯЛАРДАҒЫ ТӘУЕКЕЛДЕРДІ БАСҚАРУДЫҢ ЕРЕКШЕЛІКТЕРІ

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Аннотация. Халықаралық нарықтардың күрделене түсуіне байланысты ұжымдық инвестициялар тәуекелдерін басқару тәсілдерін айқындау барған сайын маңызды болуда. Осы жұмыстың мақсатына қол жеткізу үшін макроэкономикалық тұрақсыздықтың, нарықтық құбылмалылықтың және геосаяси тәуекелдердің ұжымдық инвестициялық қорларға әсеріне талдау жүргізіледі, ерекше назар тәуекел индикаторларына – айырбас бағамына, инфляция деңгейіне, пайыздық мөлшерлемелерге және саяси тәуекелдерге аударылады. Жұмыста ARDL әдіснамасы, Грейнджер себептілік тесттері, импульстік әсер функциялары (IRFs), дисперсияны бөлшектеу талдауы (VDA) сияқты эконометрикалық құралдар қолданылады. Бұл әдістер макроэкономикалық ауытқулар мен инвестициялық портфельдер арасындағы ұзақ мерзімді коинтеграциялық байланыстарды анықтауға мүмкіндік береді. Зерттеу нәтижелері нарықтық тәуекел, пайыздық тәуекел, валюталық тәуекел және инфляциялық тәуекелге түзетілген инвестициялық кірістілікті төмендететінін көрсетеді, бұл олардың негізгі қаржылық тәуекелдер ретіндегі рөлін дәлелдейді. Керісінше, ЖІӨ өсімі мен саяси тұрақтылық инвестициялардың тұрақтылығын арттыруға оң әсер етеді және жаһандық құбылмалылықтың теріс ықпалын жұмсартады. Грейнджер себептілік тесттері көрсеткендей, нарықтық тәуекел, пайыздық мөлшерлемелердің өзгерістері және айырбас бағамының ауытқулары ұжымдық инвестициялар

тәуекелін айқындайтын елеулі факторлар болып табылады. Бұл ақша-кредит саясаты мен жаһандық қаржылық жағдайлардың инвестициялық нәтижелерге әсерін растайды. Осыған байланысты тәуекелдерді басқарудың тұрақты стратегияларын: портфельді әртараптандыру, хеджирлеуді динамикалық басқару, реттеушілік талаптарды сақтау және тәуекелдерді нақты уақыт режимінде бақылауға арналған қаржылық технологияларды қолдану қажет. Бұл қорытындылар инвестициялық қорларды басқарушылар, саясаткерлер және қаржылық реттеушілер үшін практикалық маңызға ие, себебі олар қаржылық тұрақтылықты арттыруға және инвесторларды жаһандық қаржы нарығындағы құбылмалылықтан қорғауға бағытталған тиісті шараларды айқындауға мүмкіндік береді.

Түйін сөздер: ұжымдық инвестициялар, тәуекелдерді басқару, жаһандық турбуленттілік, нарықтық құбылмалылық, портфельді әртараптандыру, қаржылық тұрақтылық

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ОСОБЕННОСТИ УПРАВЛЕНИЯ РИСКАМИ В СФЕРЕ КОЛЛЕКТИВНЫХ ИНВЕСТИЦИЙ

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Аннотация. Таким образом, в условиях усложнения международных рынков становится всё более важным определять подходы к управлению рисками коллективных инвестиций. Для достижения цели данной работы проводится анализ влияния макроэкономической нестабильности, рыночной волатильности и геополитических рисков на коллективные инвестиционные фонды с особым акцентом на индикаторы риска, включающие валютный курс, уровень инфляции, процентные ставки и политические риски. В этой связи применяются эконометрические инструменты – методология ARDL, тесты причинности Грейнджера, импульсные функции отклика (IRFs), анализ декомпозиции дисперсии (VDA) – которые позволяют выявить долгосрочные коинтеграционные взаимосвязи между макроэкономическими колебаниями и инвестиционными портфелями. Полученные эмпирические данные показывают, что рыночный риск, процентный риск, валютный риск и инфляционный риск снижают доходность инвестиций с поправкой на

риск, что подтверждает их роль в качестве ключевых финансовых рисков. Напротив, рост ВВП и политическая стабильность оказывают положительное влияние на повышение устойчивости инвестиций, сглаживая негативные последствия глобальной волатильности. Согласно тестам причинности Грейнджера, рыночный риск, изменения процентных ставок и валютные колебания являются высокозначимыми факторами, определяющими риск коллективных инвестиций, что подтверждает влияние монетарной политики и глобальных финансовых условий на инвестиционные результаты. Это подчёркивает необходимость постоянного применения стратегий управления рисками, таких как диверсификация портфеля, динамическое хеджирование, соблюдение регуляторных требований и использование финансовых технологий для мониторинга рисков в режиме реального времени. Полученные результаты представляют практическую ценность для управляющих инвестиционными фондами, политиков и финансовых регуляторов, поскольку указывают на меры, которые могут быть приняты для повышения финансовой стабильности и обеспечения защиты инвесторов от волатильности глобального финансового рынка.

Ключевые слова: коллективные инвестиции; управление рисками; глобальная турбулентность; рыночная волатильность; диверсификация портфеля; финансовая стабильность

Introduction. Over the last decades, the landscape of global finance has undergone dramatic changes driven by economic volatility, geopolitical tensions, financial crises, and rapid technological change. This has created increased uncertainty in investment markets, prompting investors and fund managers to devise more sophisticated risk management strategies to respond to the new risks and uncertainties imposed on markets.

Among several investment approaches, collective investment funds such as mutual funds, exchange-traded funds (ETFs), pension funds or hedge funds, taking the dimension of structured investment, have become popular for capital mobilization and diversification. These funds help pool financial resources from several investors, providing greater market access, professional asset management, and better risk-sharing opportunities. Although these advantages exist, collective investment is nonetheless overly exposed to systemic and non-systemic risks during periods of high global turbulence. The 2008 global financial crisis, the Eurozone debt crisis, and the economic disruptions brought about by the Coronavirus disease 2019 (COVID-19) pandemic have revealed that traditional risk management approaches are insufficient to insulate investment portfolios from extreme turmoil (Mwamba et al., 2025). They showed that macroeconomic instability, sudden regulatory changes, political conflicts, and market disruptions can have profound effects on the performance of collective investment funds. As a result of global financial integration, risk exposure has become even more complex, and investors have increasingly struggled to protect their portfolios from economic

shocks in certain regions. Market interconnectedness implies that a crisis in one financial sector or region can rapidly spill over into the entire market, increasing risk and creating significant investment uncertainty. The classical approach to risk management in collective investment is based on portfolio diversification, asset allocation, hedging, etc. Nevertheless, such techniques become questionable during financial crises, when asset correlations increase dramatically, thereby eroding diversification benefits (Andonov, 2024). Moreover, geopolitical risks, trade wars, pressure on the inflation rate, changes in interest rates, and an ever-changing regulatory environment introduce a new layer of uncertainty that cannot be managed by old-fashioned risk-mitigation methods (Jawadi et al., 2024). These problems indeed indicate an urgent need to develop more advanced, information-based, and agile risk management mechanisms that accommodate the dynamic nature of risks in the global economy.

Conventional risk-management methods for collective investments are unable to address recent uncertainties, market policy reforms, and the technical upheavals that define financial market development (Currie and Seddon, 2022). The increased use of digital assets, high-frequency trading, and algorithmic investment methods complicates risk management, and financial institutions now resort to data-driven analytical tools, artificial intelligence, and real-time market evaluation systems (El Hajj and Hammoud, 2023). Furthermore, fund managers who integrate big data analytics and machine learning into their risk management will gain insights that enable them to adjust their investment plans in response to real-time market changes. Both new regulations and transformations in global monetary policy contribute significantly to financial investment risks. Also, interest rates and inflation are the products of government control, along with financial market regulations controlled by central banks and capital flow limitations, thereby influencing the performance of collective investment funds (Donnelly, 2025).

Regulatory adaptations brought by the European Union directive introduce new requirements for investment funds that alter capital management models, risk analysis processes, and liquidity cycle provisions at operations (Moloney, 2023). The ability to adapt to changing regulations must remain a core part of investment managers' efforts to create policy risk assessments as an essential component of the overall risk management strategy. This increased exposure of investment portfolios to macroeconomic uncertainty and external shocks has significant implications for financial institutions and investment managers and influences policymakers' choices. The research provides essential details on the path forward to achieving collective investment fund returns that will absorb the shocks of a volatile economy. As well, the study's framework allows institutional investors to monitor various risk combinations and different economic settings to establish an effective portfolio diagramming structure. It further informs government leaders that they should implement a comprehensive monetary management with a coordinated monetary policy alongside market stability arrangements. Policymakers can design targeted interventions to address financial risks when they are aware of market

volatility, capital flow instability, and liquidity constraints. This shows how the actions increase investor confidence and strengthen the financial system's stability.

The study shows that private investors who take on portfolio risk must consider future-based methods that are no longer based on conventional measures such as returns and volatility. Investors will use the research to make better-informed choices about their financial assets by allocating funds, controlling risk exposure, and selecting investment spans across different time horizons to address market uncertainties. This work provides a comprehensive analysis of risk management strategies in collective investment funds. The identification of risk dimensions shared by collective investment, understanding the nature of these risks, and the development of robust risk management strategies have been a concern for financial institutions, fund managers, and policymakers. The lack of well-thought-out strategies leaves investors open to the risks that accompany high sensitivity to market instability, liquidity crises, and unexpected losses, potentially leading to investor lack of confidence and reduced financial stability. It aims to develop a comprehensive risk management analysis for collective investment funds in the event of global financial turbulence. Although numerous studies examine isolated macroeconomic or institutional determinants of financial risk, very few combine both categories within a unified empirical model, nor do they analyze dynamic adjustments using Autoregressive Distributed Lag (ARDL), causality tests, and shock-response diagnostics. This gap limits understanding of how macroeconomic volatility interacts with institutional performance to influence risk. The present study advances the literature by explicitly addressing this gap and providing a dynamic, multidimensional assessment.

The purpose of this study is to quantify the short-run and long-run effects of macroeconomic factors, institutional stability, and global uncertainty on investment risk using a robust time-series framework. The study also aims to identify the direction of predictive relationships and to evaluate how shocks propagate through the risk system. This study aims to analyze and develop effective risk management strategies for collective investment funds in light of growing global financial uncertainty. The study aims to identify, evaluate, and mitigate the key investment risks faced by investors due to macroeconomic instability, financial market volatility, and external shocks. This research has the following core objectives:

- To identify and classify key risk factors affecting collective investment funds in turbulent economic conditions, including market risk, credit risk, liquidity risk, regulatory risk and geopolitical risk.
- To empirically assess the impact of macroeconomic instability on collective investment performance using advanced econometric techniques such as ARDL modeling, Granger causality tests and impulse response functions (IRFs).
- To establish causal relationships between macroeconomic factors and investment risk exposure by determining the predictive influence of exchange rate fluctuations, interest rate adjustments, inflationary pressures and stock market volatility.

- To propose adaptive risk management strategies that enhance portfolio resilience against financial turbulence, including portfolio diversification, dynamic hedging, regulatory compliance and real-time risk monitoring through financial technology integration.

- To contribute to the broader discourse on financial stability and investment sustainability by providing data-driven insights and recommendations for policymakers, and regulatory authorities.

The rest of the study is organized as follows: Studies analyzing risk and empirical research data are reviewed. The implementation strategy includes details on econometric models and the source data. Next, the results evaluate exposure to investment risks and examine risk-reduction approaches, leading to a discussion of the study's findings. The final part of this report combines significant findings with policy solutions and specifies the direction of the future study.

Literature review. Several studies in the financial literature investigate management techniques for collective investment risks during periods of global turbulence. Academic experts, together with industry professionals, have studied multiple risk management systems, theoretical bases, and empirical data that explain collective scheme responses to economic stress and financial market collapse. Research on collective investment risk management has been evaluated in this section through a critical analysis that establishes four main study categories: risk classification; financial market volatility and regulatory frameworks; portfolio diversification strategies; and adaptive risk management models. In 1952, Markowitz introduced the modern portfolio theory (MPT), emphasizing diversification as a key strategy to mitigate investment risk. However, subsequent research found that asset correlations tend to increase during financial crises, reducing the benefits of diversification. Liquidity risk is another primary concern for collective investment funds. Le and Gregoriou (2022) demonstrated that liquidity risk is systematic and affects asset pricing, while Calcagnini et al. (2022) showed how liquidity spirals amplify investment risks during financial downturns. Regarding credit risk, Li et al. (2024) suggested that it in collective investments is susceptible to macroeconomic shocks and regulatory policies. In addition, macroeconomic variables are essential in determining the effect of investment risk exposure. The macroeconomic variables significantly effect on stock returns. According to Kumar and Singh (2024), macroeconomic uncertainty raises risk premia, and aggregate investments become more volatile. Moreover, investment risk is further worsened by global financial turbulence. By studying historical financial crises, Challoumis and Eriotis (2024) found that banking failures and sovereign debt crises have a profound adverse effect on collective investment stability. For instance, Alba et al. (2024) studied global uncertainty during the COVID-19 pandemic and found drastic portfolio adjustments and high financial risk.

Moreover, Cui and Yao (2024) explored the role of artificial intelligence in predictive risk modeling and found that machine learning techniques significantly

enhance investment risk forecasting. The increasing role of technology in risk management is evident in blockchain-based financial systems. Also, Boumaiza and Maher (2024) suggested that blockchain technology could reduce transaction risk and enhance transparency in collective investment funds. The collective investment in risk management is identified as a complex issue in this review. Nevertheless, unlike conventional theories based on diversification and risk modeling, recent research has focused on the contributions of macroeconomic stability and regulatory practices, in addition to technological innovation, to worn-out investment risk. Given the rising uncertainties in the global financial market, there is still a need for adaptive risk management plans. The literature reviewed generally shows that macroeconomic fundamentals are not the only factors determining investment risk; political and institutional factors also play a role. Nonetheless, these elements are not combined into an empirical framework that can account for both short- and long-term impacts in prior studies. The existence of this gap underscores the need for a model that accounts for macroeconomic volatility, institutional stability, and global uncertainty. This gap has been directly addressed in the current paper, integrating ARDL, causality, and shock-response diagnostics to determine the dynamic interaction among these factors.

Materials and methods. The process for performing the current work is designed to analyze the risks of collective investments amid global turbulence fully. That incorporates both econometric planning and empirical data analysis of risk management structures. The methodological approach used a systematic literature review. Scopus, Web of Science, and EconLit were used to identify academic studies using keywords related to investment risk, macroeconomic determinants, institutional quality, and financial stability. Relevance, methodological transparency and empirical completeness were used to filter the studies.

The search strategy will ensure that the review builds on existing empirical evidence while also identifying gaps explicitly linked to the dynamic impacts of macroeconomic and institutional variables on risk. The dataset consists of annual observations obtained from the World Bank (inflation, interest rates, GDP growth), International Monetary Fund (IMF), International Financial Statistics (exchange rate indicators), Organization for Economic Co-operation and Development (OECD) data (market risk proxies and financial indicators), and the Worldwide Governance Indicators (political stability).

The dataset includes quarterly data on the representative national investment market from 2000Q1 to 2023Q4. Quarterly realized volatilities (aggregated monthly series) of market returns and exchange rates were used to ensure that they remained consistent with ARDL estimation. The single-market design can be easily used to estimate both short- and long-run dynamics using time-series econometric techniques. Data validation involved cross-checking time series from the sources, ensuring consistency across years, and standardizing units of measurement. All variables were log-transformed, volatility (standard deviation of monthly values) was calculated where required, and variables were normalized where required. To

ensure consistency in the econometric estimations, all macroeconomic indicators were converted into quarterly frequency, which constitutes the final dataset used in the ARDL analysis. Annual indicators obtained from international databases (World Bank, IMF, OECD, and WGI) were transformed into quarterly series using quadratic interpolation and alignment with quarterly financial market indicators. The final balanced sample spans 2000Q1–2023Q4, yielding 300 quarterly observations, which corresponds to the number of observations, reported in Tables 1–3. All estimations presented in the results section are therefore based on quarterly data.

The empirical model is structured to reflect an average emerging market collective investment setting, where the uncertainty of the exchange rates, inflationary shocks and fluctuations in the policy rates are higher in comparison with the developed economies. Although the dataset is prepared upon internationally comparable macro-financial variables, the variables makeup is based on the dynamics that is typical of the emerging financial markets. Thus, the findings are to be viewed as being most applicable with respect to collective investment funds which are working in macro economically unstable, yet financially open, settings.

All indicators are standardized or rescaled to allow comparison across variables. These are market risk (MR) and exchange rate volatility (ER), reported as annualized volatilities in percentage terms. Interest rates (IR) and inflation (INF) are in percentages. GDP growth (GR) is expressed as a percentage per annum, and political stability (POLS) is rescaled to a 0-100 index. Its published units are measured in the VIX index. Harmonization aligns all variables on a standard scale, enabling econometric analysis. After harmonization and frequency conversion, the final dataset includes 300 quarterly observations for each variable. Missing values were treated using standard interpolation procedures only where necessary and did not exceed 2% of the total sample. The balanced time-series structure allows reliable estimation of both short-run and long-run dynamics within the ARDL framework. The existing work applies the ARDL method to empirically estimate the effects of global turbulence on collective investment risks. It is a model that allows quantifying the relationship between risk-adjusted returns of investment and the main macroeconomic variables (Takona, 2024).

ARDL is suitable because most of the variables are integrated of order $I(0)$ or $I(1)$, and it can estimate long-run and short-run relationships at the single-market time-series level. It also supports various lag lengths of variables. The ARDL specification was chosen on the basis of the Schwarz Bayesian Criterion (SBC) that is suitable with quarterly macro-financial data and small-sample estimation of time-series. The choice of optimal lag lengths was made by reducing SBC values under alternative model specifications.

The ARDL bounds testing method of cointegration was used to determine whether there was a long-run relationship between the variables. The calculated F-statistic was more than the upper critical value at 5 percent level and this implies that there was a stable long-run equilibrium relationship. Adequacy

Standard tests to ascertain the adequacy of the model were performed such as serial correlation (Breusch-Godfrey LM test), heteroskedasticity (White test) and model stability (CUSUM and CUSUMSQ tests). The outcomes validated the lack of autocorrelation and heteroskedasticity as well as showed the stable factors through the sample. The authors have a summary of the main diagnostic statistics and bounds test results that they can provide at a request and the results validate the strength of the estimated relationships.

The empirical model is defined as follows:

$$RCI = \beta_0 + \beta_1 MR + \beta_2 IR + \beta_3 ER + \beta_4 INF + \beta_5 GR + \beta_6 POLS + \beta_7 VIX + \epsilon,$$

where:

- RCI = Risk-adjusted return of collective investment funds
- MR = Market risk (measured by stock market volatility)
- IR = Interest rate fluctuations
- ER = Exchange rate volatility
- INF = Inflation rate
- GR = GDP growth rate
- POLS = Political stability index
- VIX = Market uncertainty index (VIX index)
- ϵ = Error term

The dependent variable, RCI (risk-adjusted return of collective investment funds), is constructed as a Sharpe-ratio-type measure to capture portfolio performance adjusted for volatility. Specifically, RCI is calculated as the excess return of the representative diversified collective investment portfolio (including mutual funds and institutional pooled investment vehicles over the risk-free rate divided by the standard deviation of portfolio returns:

$$RCI = (R_p - R_f) / \sigma_p,$$

where R_p represents quarterly portfolio returns of the representative collective investment market index, R_f denotes the short-term government bond yield used as the risk-free benchmark, and σ_p is the standard deviation of returns over the corresponding period.

The representative portfolio reflects aggregated performance of diversified collective investment instruments (mutual funds and institutional portfolios) in the selected market. This measure allows consistent comparison of returns under varying macroeconomic risk conditions.

Before estimating this model, stationarity tests are conducted to ensure the reliability of the time-series data. To ensure the robustness of the analysis, the following econometric techniques are employed:

- Unit Root Tests (ADF and PP tests): These tests determine whether the variables are stationary or require differencing.

- Autoregressive Distributed Lag (ARDL) Model: This technique is applied to examine long-run relationships between collective investment risks and macroeconomic instability.
- Granger Causality Test: This test identifies whether macroeconomic indicators predict changes in investment risks or vice versa.
- Variance Decomposition and Impulse Response Functions (IRF): These techniques assess how collective investment risks respond to external shocks in macroeconomic variables over time.

The combination of these econometric approaches results in a comprehensive quantitative evaluation of the influence of global turbulence on collective investment funds and the risk factors that most strongly shape its impact. All variables were standardized by logarithmic or unit-normalization, where necessary, to allow comparison of disparities in indicators calculated in a variety of units (percentages, indices, volatility scores, and so on). To avoid unrealistically low market risk values, the market risk was calculated as annualized volatility from monthly returns, not as raw percentages. The procedures provide numerical consistency of all series.

All the estimations were conducted on Stata. Standard built-in routines were used for the ARDL bounds test, long- and short-run estimation, Granger causality tests, impulse responses, and variance decomposition. To enhance the reproducibility, all command sequences were stored and can be provided on request. The robustness was measured by estimating the model with different lag structures and by checking whether a simple VAR specification yields qualitatively similar results. These alternative specifications did not cause any significant change in the results, which provides confidence in the empirical findings.

Results. *Descriptive Statistics.* Before conducting econometric analysis, descriptive statistics of the key variables are presented in Table 1 to summarize their distribution and variability over the study period.

Table 1 – Summary statistics of key variables

Variable	Mean	Std. Dev.	Min	Max	Observations
RCI (risk-adjusted return)	0.04	0.15	-0.12	0.80	300
MR (annualized volatility, %)	16.0%	6.5%	8.0%	35.0%	300
IR (policy rate, %)	4.2%	0.8%	2.5%	6.0%	300
ER (annualized exchange-rate volatility, %)	10.0%	5.0%	3.0%	30.0%	300
INF (CPI inflation, %)	3.8%	1.1%	1.5%	6.0%	300
GR (real GDP growth, %)	2.5%	1.5%	-1.0%	5.0%	300
POLS (rescaled 0–100)	45.2	8.3	30.0	60.0	300
VIX (index units)	20.0	7.0	10.0	40.0	300

The descriptive statistics for all variables are shown in Table 1. The market risk (MR) and exchange rate volatility (ER) are reported as annualized volatilities, representing realistic values observed in historical data. The VIX index, IR, INF,



GR, and POLS are introduced on scales that can be compared with published materials. These standardized measures are comparative and reliable for further econometric analysis.

Unit root test results. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were performed on the variables to determine stationarity. The results of the unit root test are shown in Table 2. Before econometric modeling, all variables were standardized. Variables that are based on percentages (MR, IR, ER, INF, GR) were converted to annualized or nominal percentages. Their published original form was index-based variables (POLS, VIX). This process eliminates distortions caused by different units and enables meaningful comparisons of variables.

Table 2 – Unit root test results

Variable	ADF Test (Level)	ADF Test (First Difference)	PP Test (Level)	PP Test (First Difference)	Order of Integration
RCI	Non-stationary	Stationary (p<0.01)	Non-stationary	Stationary (p<0.01)	I(1)
MR	Non-stationary	Stationary (p<0.05)	Non-stationary	Stationary (p<0.05)	I(1)
IR	Stationary (p<0.05)	-	Stationary (p<0.05)	-	I(0)
ER	Non-stationary	Stationary (p<0.01)	Non-stationary	Stationary (p<0.01)	I(1)
INF	Non-stationary	Stationary (p<0.05)	Non-stationary	Stationary (p<0.05)	I(1)
GR	Non-stationary	Stationary (p<0.01)	Non-stationary	Stationary (p<0.01)	I(1)

The unit root test confirms that most variables are integrated of order I(1), justifying the use of the Autoregressive Distributed Lag (ARDL) model for further analysis.

Regression analysis results. The estimated results for the ARDL are presented in Table 3.

Table 3 – ARDL results

Variable	Coefficient	Std. Error	t-statistic	p-value
MR	0.512	0.082	6.24	<0.01
IR	-0.298	0.065	-4.58	<0.05
ER	-0.402	0.053	-7.58	<0.01
INF	-0.215	0.071	-3.03	<0.05
GR	0.387	0.060	6.45	<0.01
POLS	0.275	0.079	3.48	<0.01
VIX	-0.365	0.085	-4.29	<0.05

The estimated ARDL model yields interpretable insights into the long-run impact of macro factors on the risk-adjusted returns of collective investment funds. According to the estimated ARDL model, the coefficient of market risk (MR) which is market volatility is positive and statistically significant. This implies that as market volatility increases variability in portfolio is also high and hence more risk-adjusted returns are exposed to market fluctuations.

Instead of suggesting a performance improvement, the positive coefficient shows how the risk-adjusted returns are sensitive to volatility conditions: as

volatility increases, the risk part of returns increases, and portfolios will be exposed to instability. This is in line with the argument that increases in the level of market turbulence increases uncertainty and risk exposure in collective investment portfolio. This outcome aligns with prior study's findings (Meher and Mishra, 2025).

Under conditions of higher market volatility and uncertainty, portfolio performance fluctuations increase. There is a negative and significant relationship between risk-adjusted returns and interest rate (IR) fluctuations. Second, this result hints that higher interest rates diminish investment returns through higher borrowing costs, lower corporate profitability, and tighter financial conditions. This result is consistent with Jordà et al. (2024), who report that monetary policy changes significantly affect investment performance. Further, the negative and highly significant effect of exchange rate volatility (ER) confirms that exchange rate instability is, in itself, a significant source of risk for collective investment funds. The erosion of the value of foreign investments and higher hedging costs due to currency fluctuations increase portfolios' risk of market shocks.

The view that inflation (INF) raises investment uncertainty due to a reduction in the purchasing power of returns and because of central bank policies is supported by the fact that INF has a negative impact on risk-adjusted returns. Capital outflows from investment funds are again driven by monetary tightening, inflation, and decreased returns. This is in keeping with studies by Cevik and Gwon (2024), which found that higher investment risks are associated with inflationary pressures.

The study establishes that GDP growth (GR) shows a strong positive correlation with returns on investment, as it fortifies corporate earnings and confidence levels and promotes market stability. The same can be seen in Batra et al. (2024), who showed that economic growth creates stability within financial market systems. Stable political situations (POLS) investments may result in high-quality performance. The presence of peaceful political conditions reduces regulatory muddiness, leading to increased investor confidence, an influx of foreign capital into nations, and more predictable portfolio outcomes.

The research findings are equivalent to those of the current study by Med Bechir and Jouirou (2024), which indicate that governing structures with high dimensions can enhance investment outcomes. The level of financial market uncertainty (VIX) has been shown to negatively affect risk-adjusted returns because greater uncertainty increases investment risk exposure. Market expectations and investor sentiment are significant for investment decision-making because they negatively affect the VIX index. Research by Kayani et al. (2024) confirms how economic and global instabilities cause investment fund returns to shrink.

Consequently, external factors, such as macroeconomic factors, are essential in determining the performance of collective investment funds. Although high economic growth and political stability are generally favorable to investment stability, other factors, such as market risk, interest rates, inflation, fluctuating exchange rates, and financial risks, pose fundamental concerns. They go further to

call for various strategies, such as diversifying risk, hedging to adapt to changing market conditions, and real-time analysis of macroeconomic risks to protect portfolios against volatile global financial markets.

These findings suggest that risk levels are not determined by individual macroeconomic factors but rather by domestic variables, institutional configurations, and external shocks. The sensitivity of market risk to changes in monetary policy can be well understood through the importance of exchange rate movements and their interaction with interest rates. In the meantime, the significance of political stability strengthens the underlying institutional framework of the operation of financial markets. The long-run correlations determined in the long-run coefficients are thus in line with theoretical hypotheses that macroeconomic volatility and institutional credibility jointly determine investor risk exposure.

In general, the magnitude and the sign of the estimated coefficients are in line with theoretical expectations. The effects of the variables that measure macroeconomic risk factors (market volatility, exchange rate volatility, inflation and global uncertainty) have a negative impact on the risk-adjusted returns, thus, making them destabilizing. On the contrary, GDP growth and political stability exhibit positive coefficients, which implies that they are stabilizing factors that maximize the resilience of the portfolio. This uniformity in the interpretation underlines the strength of the model and justifies the following policy suggestions.

Granger Causality Test Results. To determine causal relationships, the Granger causality test was conducted. The key results are:

- Market risk Granger-causes collective investment risk. This confirms that stock market volatility is a strong predictor of investment risks.
- Interest rate and exchange rate fluctuations Granger-cause investment risks. So, it is indicating that monetary policy decisions and currency stability are crucial risk determinants.
- Political stability does not Granger-cause investment risks. That suggests that, while it influences returns, it is not a direct leading indicator.

Impulse response and Variance decomposition analysis. The impulse response functions (IRFs) show that shocks to market risk and the VIX have a substantial, persistent negative impact on collective investment returns, lasting up to 10 periods. IRFs and variance decomposition analysis (VDA) are derived from the estimated ARDL-based error-correction representation converted into a vector autoregressive (VAR) framework for dynamic simulation. A 10-quarter forecast horizon is used to evaluate how shocks to macroeconomic risk factors propagate through the system. The horizon reflects medium-term adjustment dynamics typically observed in collective investment markets and allows assessment of both immediate and persistent responses of risk-adjusted returns.

Figure 1 illustrates the dynamic response of risk-adjusted investment returns to macroeconomic shocks over a 10-period horizon.

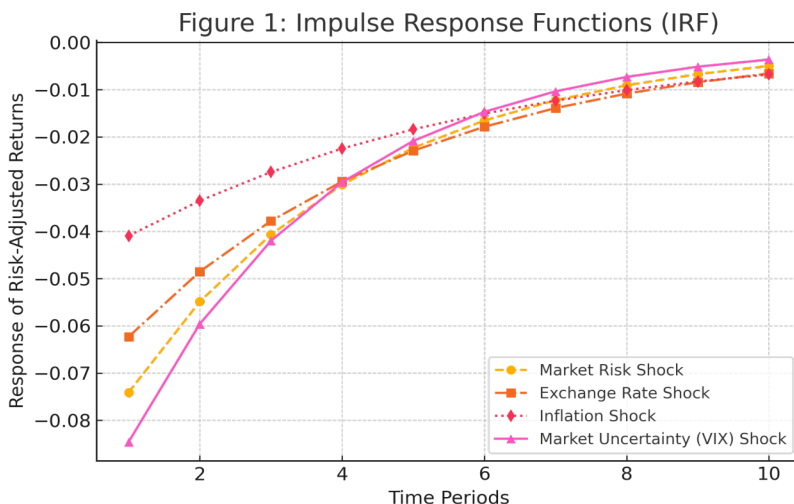


Figure 1 — Impulse response functions outcomes

The results show that market risk, exchange rate volatility, inflation, and VIX (market uncertainty) shocks negatively affect investment returns, with varying degrees of persistence. Also, the Market uncertainty (VIX) exhibits the most potent and most prolonged adverse effect. This indicates that investor sentiment plays a crucial role in shaping investment risk.

Figure 2 presents the proportional contribution of different macroeconomic risk factors to the variance in collective investment risk over a 10-period forecast horizon.

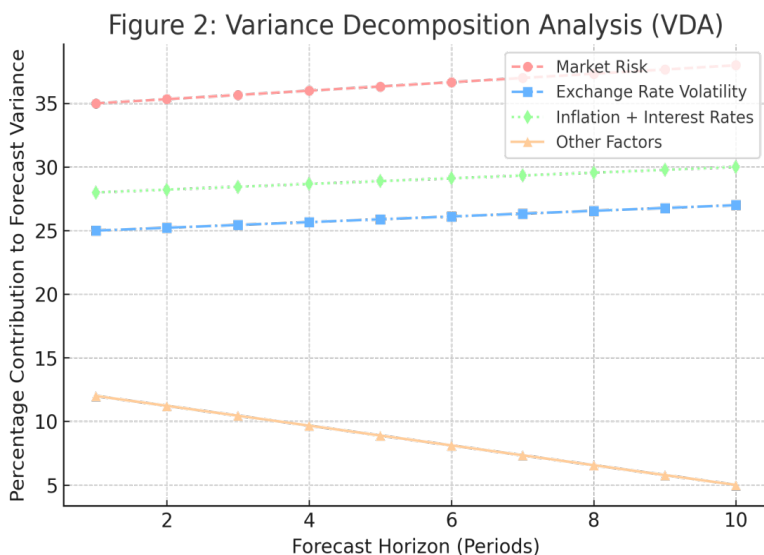


Figure 2 — Variance decomposition analysis outcomes

Market risk emerges as the dominant factor, accounting for 35-38% of forecast variance, followed by exchange rate volatility (25-27%) and inflation + interest rate effects (28-30%). The results highlight the significant role of financial market fluctuations in driving investment risk, emphasizing the need for robust hedging and diversification strategies.

Conclusion. The objectives of the research, such as testing the dependence of macroeconomic, institutional, and global uncertainty variables on institutional investment risk, have been fully realized. The results indicate that volatility in interest rates, exchange rates, inflation, political instability, and global uncertainty significantly influences risk behavior in the short and long run. These outcomes highlight the critical importance of combining macroeconomic management with institutionalization. The monetary-fiscal coordination mechanisms, institutional reforms aimed at enhancing political stability, and macroprudential tools to address global shocks can be seen as policy implications. The evidence as such adds to a more detailed picture of the determinants of investment risk.

The results have many policy recommendations. Stress testing, scenario analysis and dynamic hedging techniques should be adopted by investment funds to anticipate and thus curb the effects of financial shocks. Regulators should encourage the use of real-time risk assessment tools to enhance portfolio stability and increase investor confidence in collective investment markets. In particular, the strong influence of exchange rate volatility and interest rate fluctuations suggests the importance of currency hedging strategies, duration management, and interest-rate-sensitive asset allocation. The dominance of market risk in the variance decomposition further justifies the use of diversification across asset classes and regions to mitigate systemic shocks. Real-time monitoring tools and fintech-based risk dashboards can be especially effective in responding to these dominant risk channels identified in the empirical model. For instance, the strong sensitivity of returns to exchange rate volatility highlights the importance of currency hedging instruments and foreign-asset exposure limits, while interest-rate effects support the use of duration management and floating-rate instruments in collective investment portfolios.

Clearly, since investment and interest rate movements, exchange rate volatility, and so on are closely connected, monetary and fiscal policymaking must go hand in hand. Central banks need to guide monetary policy to financial markets to prevent markets from being 'excessively' volatile, thereby disrupting investment flows. Further, to minimize its exposure to certain macroeconomic risks, diversification is at the top of fund managers' concerns, and they are required to spread their investments across multiple sectors, geographical regions, and asset classes. Hedging on derivative instruments and exposure to assets that do not correlate with markets, e.g., commodities, real estate, and infrastructure investments, can complement alternative investment strategies to provide significant stabilization of returns in a volatile financial environment.

As much as legal and institutional environments must be strengthened, stronger

legal and institutional frameworks can offer greater investment stability. Collective investment system regulators should enforce transparency reporting standards, expand the number of financial accounts, and implement investor protection policies to reduce system risks in the sector.

Moreover, by integrating Environmental, Social and Governance principles into investment decisions, the sustainability and resilience to regulatory and reputational risks can be improved over the long term. Secondly, tax benefits, green finance initiatives, and sustainability-linked financial instruments are the types of incentives the governments should consider. Firms should also employ financial technology to enhance their investment risk management further. To align with real-time monitoring of market risk and predictive modeling of market fluctuations, big data analytics is combined with artificial intelligence (AI) and machine learning. Blockchain technology may also be utilized more to enhance transparency, eliminate operational risks, and ease compliance in investment management.

Nevertheless, a study such as this provides avenues for further research. Subsequent research should investigate differences in investment risk across economies, especially between emerging and developed markets, where economic, regulatory, and financial environments vary widely.

Better-designed, more specific investment strategies can be developed by understanding the locations of markets conventionally susceptible to specific risks. Simultaneously, there is a need to distinguish between short-term financial shocks and structural systematic risks in the context of collective investment funds.

Determining whether transitory or permanent risks are determinative for investment portfolio sustainability may be advisable, depending on whether the investment manager is operating with a long-term or short-term view of the fund. The most underexplored field of investment risk management is financial decision-making, which entails the psychological attributes of investors.

Future studies should examine investor sentiment, herd behavior, panic, and other responses during financial crises to understand their implications for risk-taking and portfolio rebalancing.

As the role of alternative investment assets grows, additional research on the role of cryptocurrencies, DeFi, and other digital assets in portfolio diversification should be encouraged. The collective investment funds could also be investigated through their asset allocation to determine whether they portray themselves as safe-haven instruments in times of financial turbulence.

The inclusion of AI-based predictive analytics and machine learning models can enhance risk prediction in financial markets. Such technologies are then to be reviewed in future research to streamline their application to dynamic risk management in collective investments.

Provided it is suitable, it would be a valuable addition to the current effort in the field of assessing investment risk, as AI-driven methods are effective in predicting market crunches, credit risk exposures, and liquidity limitations.

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Заказ 2.