COST Action
Progress Report at 24 months
(14/09/2020 to 14/09/2022)

CA19130: Fintech and Artificial Intelligence in Finance - Towards a transparent financial industry

The Action was approved by the Committee of Senior Officials (CSO) on 31-3-2020 and has the MoU reference COST 033/20.

This report shows the data entered into e-COST to enable the Action Chair to verify the completeness and accuracy of the report with the MC prior to submitting the report via e-COST in fulfilment of the rules for COST Action Management, Monitoring and Final Assessment.

Action leadership and participants

Leadership positions

Position	Name	Contact details	Country*
Chair	Prof Jörg Osterrieder	joerg.osterrieder@utwente.nl +41774692809	Switzerland

Position	Name	Contact details	Country*
Action Vice-Chair	Prof Valerio Poti	valerio.poti@ucd.ie 00353-1-7168961	Ireland

Working groups

#	WG Title	# of participants	WG Leader	Country*
1	Transparency in FinTech	259	Prof Wolfgang Härdle haerdle@hu-berlin.de	Germany
2	Transparent versus Black Box Decision-Support Models in the Financial Industry	234	Prof Petre Lameski lameski@finki.ukim.mk	North Macedonia
3	Transparency into Investment Product Performance for Clients	205	Prof Peter Schwendner scwp@zhaw.ch	Switzerland

Other key leadership positions

Position	Name	Contact details	Country*
Science Communication Coordinator	Dr Alessia Paccagnini	alessia.paccagnini@ucd.ie	Ireland
GH Scientific Representative	Branka Hadji Misheva	heb1@bfh.ch	Switzerland

* The country displayed is:

- for the Action Chair, the country that nominated that person to the Management Committee before they were elected Action Chair;
- for the Action Vice-Chair the country that nominated the person as a Management Committee Member,
- for all other leadership positions, if the person is a MC Member the country displayed is the country of nomination, otherwise it is the country of the person's primary work affiliation.

Participants

COST members having accepted the MoU

AL	13/05/2020	AM	09/01/2023	AT	30/04/2020	BE	17/02/2021	BA	30/04/2020
BG	04/09/2020	HR	02/06/2020	CY	17/02/2021	CZ	14/07/2021	DK	28/05/2020
EE	04/05/2020	FI	02/11/2021	FR	05/05/2020	GE	12/04/2022	DE	08/05/2020
EL	22/05/2020	HU	13/05/2020	IS	05/05/2020	IE	29/04/2020	IL	11/05/2020
IT	12/06/2020	LV	12/07/2021	LT	17/05/2020	LU	30/04/2020	MT	22/02/2021
MD	17/10/2020	ME	19/05/2020	NL	25/06/2020	MK	07/05/2020	NO	06/05/2020
PL	30/04/2020	PT	28/05/2020	RO	10/06/2020	RS	27/06/2020	SK	29/04/2020
SI	27/05/2020	ZA	02/11/2021	ES	18/06/2020	SE	26/05/2020	CH	20/05/2020
TR	04/05/2020	UA	12/04/2022	UK	30/04/2020				

Other participants

Institution Name	Country

Summary

The main aim and objective of the Action is to

establish a large and interconnected community across academia, public institutions and industry focusing on Financial Technology and Artificial Intelligence, improving transparency in financial services, especially in and through FinTech, in financial modelling and investment performance evaluation

During its first two years the Action progressed the achievement of this as described below

The COST Action on Fintech and AI in Finance has brought together an incredibly diverse network and we have witnessed an enormous growth of our Action to 260 interdisciplinary researchers from 49 countries, with 39 of those countries being European COST countries, to become one of the largest and most active COST Actions in Europe. This diversity of the network ensures that the research is inclusive and addresses the needs of a global audience.

The academic achievements of the network are impressive. The COST Action has organized 150 research conferences with more than 6,000 participants and 300 distinguished speakers. These events have provided a platform for researchers to present their latest findings, share ideas and collaborate on new projects.
The network's publications have been cited more than 10,000 times, demonstrating the impact and relevance of the research being conducted within the network.

The COST Action on Fintech and AI in Finance is also focused on promoting collaboration and knowledge sharing between researchers and practitioners in the field. By fostering a close working relationship between academia and industry, the network aims to ensure that the latest research findings are put into practice, which is not only beneficial to the researchers, but also to the wider community.

The objectives of the COST Action were to advance the field of fintech and AI in finance in research, education, and practice. To achieve this, the network has launched many research projects, which are focused on specific areas of fintech and AI in finance. These projects provide opportunities for researchers to collaborate and share their expertise, leading to new insights and discoveries in the field. The COST Action has also produced a very large number of publications and other output, which have been widely distributed and disseminated to the wider community.
The COST Action has promoted diversity and collaboration by using STSMs, virtual grants and many initiatives to encourage researchers from different backgrounds to work together, creating an inclusive environment for all.

In addition to these activities, the COST Action has also launched initiatives to promote knowledge transfer and collaboration. For example, it has established a number of working groups and task forces, which are focused on specific areas of fintech and AI in finance.

Overall, the COST Action on Fintech and AI in Finance has made significant progress in advancing the field of fintech and AI in finance in research, education, and practice. The network has brought together a diverse group of researchers, who have collaborated on a wide range of projects and initiatives, and have produced a significant amount of output which have been widely disseminated and have achieved a high citation count. The COST Action is also focused on promoting collaboration and knowledge sharing between researchers and practitioners in the field, to ensure that the latest research findings are put into practice, which is not only beneficial to the researchers, but also to the wider community.

The Action will implement the following measures in the coming two years to overcome any issues identified in this report as potentially endangering the achievement of the objectives of the Action

We are pleased to report that our Action, COST Action CA19130 Fintech and Artificial Intelligence, has experienced significant growth and success. Our collective output and achievements have exceeded our initial objectives, and we do not currently see any issues that could potentially endanger our progress. In the grant period, we aim to complete the majority of our objectives in GP3, and we are excited to use GP4 to extend and improve upon our work, as well as to incorporate new challenges and research topics that have arisen as a result of our research efforts.

The only exception is MoU Objective 6. Due to the changing regulatory landscape in Europe, enhanced privacy, data protection and regulatory requirements, it is not possible anymore to proceed with this objective. We are proposing to replace it with a related objective, with a substantially higher impact and importance for the purposes and outcome of our COST CA19130 Action.

Action website

https://fin-ai.eu/

Achievement of MoU objectives, deliverables and additional outputs/ achievements

MoU objectives

Please self-assess and describe the level of achievement of each MoU objective. For any MoU objective that is 25% or less achieved, please add an explanation.

Mou objective	To develop blended approaches to evaluate innovative financial services and their providers, especially in the FinTech domain, building on Machine Learning methods, focussing on prediction (early warning) of operational fragility, fraudulent and illegal behaviour ranging from appropriation of loaned funds to money-laundering activities.
Type of objective	1.a Development of a common understanding/definition of the subject matter 1.e Development of knowledge needing international coordination, pertaining to a new or improved theory, model, methodology, technology or technique
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	Our COST Action CA19130 is focused on developing blended approaches to evaluate innovative financial services and their providers, especially in the FinTech domain. One of our main goals is to build on Machine Learning methods, with a focus on prediction (early warning) of operational fragility, fraudulent and illegal behavior ranging from appropriation of loaned funds to money-laundering activities. To achieve this goal, we have formed several strategic partnerships. One such partnership is with the Romanian Fintech company iFactor, which has allowed us to work on the research and development of AI tools for financial risk assessment. We have also formed a partnership with ING Group, Amsterdam Netherlands. Early warning systems are one of the main focus of many of our partner companies, and ING Group's early warning credit system is one of the leading European early warning credit systems. Our COST CA19130 is substantially in ongoing research to improve and extend their system. In addition to these partnerships, we have also achieved several important research outcomes as a result of our COST Action CA19130 cooperation. For example, the Swiss National Science Foundation is supporting a research project on Anomaly and Fraud Detection in Blockchain networks, which is being worked on by our COST Action members. Additionally, we have a research project with a Swiss Fintech company, where we are supporting them to improve the default rating of loans. These examples demonstrate our commitment to developing new and improved theories, models, methodologies, technologies, and techniques in the field of fintech and financial services. In terms of the specific COST objectives, our action has achieved the following: 1.a - Development of a common understanding/definition of the subject matter: By working closely with practitioners from the finance industry and regulators, we have developed a shared understanding of the subject matter and the challenges facing the industry. This has allowed us to develop blended approaches that are tailored to meet the specific needs of the industry.1.e - Development of knowledge needing international coordination: Our action has brought together researchers from 49 countries globally, and 39 European COST countries, allowing for the development of knowledge that requires international coordination. By working together, we have been able to tackle complex research questions and develop new and improved theories, models, methodologies, technologies, and techniques. Overall, our COST Action CA19130 is making significant contributions to the field of fintech and financial services. By forming strategic partnerships and working closely with practitioners, regulators, and researchers, we are able to develop blended approaches that are tailored to meet the specific needs of the industry, while also

	contributing to the development of new and improved theories, models, methodologies, technologies, and techniques that are necessary for the field to evolve.

Mou objective	The development of conceptual and methodological tools for establishing when black-box models are admissible and, to the extent possible, making them more transparent and/or replacing them with interpretable and explainable models.
Type of objective	1.a Development of a common understanding/definition of the subject matter 1.c Coordination of experimentation or testing
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	Transparency, interpretability and explainability of black-box models has become one of the main research agendas of our COST Action CA19130. Our members have worked together on a substantial number of publications, research proposals, and various explainable AI tools. To achieve this goal, we have organized many research conferences around this topic with a substantial number of participants. We also disseminated the code and training material on this topic via quantlet.com and quantinar.com and created an extensive platform on Explainable AI for finance with several use cases, all papers, code repositories, interactive apps, see https://www.explainableaiforfinance.com/. We have also made significant contributions to the development of conceptual and methodological tools for establishing when black-box models are admissible and making them more transparent and/or replacing them with interpretable and explainable models. For example, a paper published by the Action provides insights on the early lapse phenomenon for the insurance contracts, exploiting interpretability algorithms applied to random forest. By applying interpretability to black-box instruments, the authors were able to show how it can give light to a phenomenon not easily explainable by white-box algorithms. Our research team has introduced different measures of local and global interpretability for different machine learning tasks, such as clustering, classification and regression, but also for different types of data such as continuous, categorical, hierarchical, and functional. In terms of the specific COST objectives, our action has achieved the following: 1.a - Development of a common understanding/definition of the subject matter: By working closely with other researchers and practitioners in the field, we have developed a shared understanding of the subject matter and the challenges facing the industry. This has allowed us to develop tools and approaches that are tailored to meet the specific needs of the industry.1.c - Coordination of experimentation or testing: We have organized research conferences and events, which have provided opportunities for researchers to test and experiment with the tools and approaches that have been developed as a result of our COST Action. Additionally, the code and training material that we have made available via quantlet.com, quantinar.com and our Explainable AI for finance platform, allows researchers and practitioners to test and experiment with these tools in their own work. This coordination of experimentation and testing has been crucial in helping us to establish when black-box models are admissible and in developing new methods for making these models more transparent. In summary, our COST Action CA19130 has made significant contributions to the field of transparency, interpretability and explainability of black-box models in fintech and financial services. By organizing research conferences, events and developing a platform on Explainable AI for finance, we have created a space for the sharing of ideas and perspectives and the testing and experimentation of new tools and approaches. This has led to the development of new conceptual and methodological tools for establishing when black-box models are admissible and in making them more transparent and interpretable.

Mou objective	

	To receive input from regulators and practitioners' communities and to validate results with regard to increasing transparency of artificial intelligence applications.
Type of objective	1.g Input to stakeholders (e.g. standardization body, policy-makers, regulators, users), excluding commercial applications 1.h Input for future market applications (including cooperation with private enterprises)
Level of progress	51 - 75%
Description of progress with achieving the MoU objective	Our COST Action CA19130 has made a significant effort to receive input from regulators and practitioners' communities and to validate results with regard to increasing transparency of artificial intelligence (AI) applications. One of the ways in which we will achieve this objective is by organizing a high-level COST policy event at the premises of the COST Association in Brussels in May 2023. This event will bring together experts from the European Commission, industry, and academia to discuss the latest developments in AI and its implications for policy. Several high-profile speakers from the European Commission have already confirmed their participation, which demonstrates the level of interest and engagement with our work. Maria Moloney, has been accepted onto the CEDPO AI WG (Working Group for Artificial Intelligence of the Confederation of European Data Protection Organisations) based in Brussels. She will be working on advising policy regarding AI from the perspective of data protection. This is an example of how our network is engaged with regulators and policymakers at the highest level and how we are able to provide valuable input to them. Many of our members also work directly with industry, either through direct cooperation or via industry-academia relationships. For example, the Action Chair has accepted an associate professorship at the University of Twente, which is a joint appointment between the University of Twente and ING Group in Amsterdam, Netherlands. Through this partnership, all COST CA19130 output is regularly discussed with and challenged by one of the largest international groups. In turn, the bank regularly provides new topics and research items that are then disseminated in our network. This is an example of how our network is able to provide input to the objectives related to stakeholders (1.g) and to future market applications (1.h). We also have close contacts to the AI team from the European Central Bank, who is substantially supporting a joint COST CA19130 application to the MSCA Doctoral Training network. This highlights the level of cooperation and support we have with regulators and practitioners' communities in our field. In summary, our COST Action CA19130 has made significant efforts to receive input from regulators and practitioners' communities and to validate results with regard to increasing transparency of artificial intelligence applications. We will achieve this through organizing high-level policy events, engaging with regulators and policymakers at the highest level, and working closely with industry partners. The involvement of our members in organizations such as the CEDPO AI WG and the European Central Bank, as well as our partnerships with major companies such as ING Group, demonstrate the level of engagement and cooperation we have with regulators and practitioners' communities. Through these efforts, we have been able to provide valuable input to the objectives related to stakeholders (1.g) and to future market applications (1.h) in our field. Overall, our COST Action CA19130 is at the forefront of shaping the future of AI in finance by working closely with regulators, practitioners, and industry to increase transparency and responsible use of AI.

Mou objective	Pruning and improvement of the vast array of performance attribution models by contributing to the development of methodologies for reducing the false discovery rate in financial research and applied financial investment management.
Type of objective	1.b Coordination of information seeking, identification, collection and/or data curation 1.c Coordination of experimentation or testing

	1.d Comparison and/or performance assessment of a theory, model, methodology, technology or technique
Level of progress	26 - 50%
Description of progress with achieving the MoU objective	This objective covers a large variety of acacemic research and papers. Many members from our network are working on closely linked and related research. The goal for the next two grant periods will be to consolidate all research into one unifying position and discussion papers, which a consortium of our network members will work on.

Two example outputs are
1) https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4209433 and 2) The Credit reform data set is at http://blockchain-research-center.com/ (WG1 leader, Prof. Härdle). |

Mou objective	Disseminate to the public and share with regulators the results on investment product performance evaluation.
Type of objective	1.i Dissemination of research results to the general public

1.j Dissemination of research results to stakeholders (excluding specific input in view of knowledge application) |
| **Level of progress** | 76 - 100% |
| **Description of progress with achieving the MoU objective** | Our COST Action CA13910 has achieved the objective of disseminating the results of our research on investment product performance evaluation to the public and regulators through a comprehensive approach. One of the most significant ways in which we have done this is through organizing a large number of research conferences and events. These events have attracted a wide range of participants, including practitioners from the finance industry, academics, and regulators, and provide a platform for knowledge exchange, discussion, and collaboration. The list of all the events can be found at https://www.meetup.com/Fintech_AI_in_Finance/ which clearly demonstrate the extent of our engagement and dissemination.

In addition to organizing events, we have also made our research results available to the public through various online platforms. For example, we have disseminated code and training material related to this topic through quantlet.com and quantinar.com, making it easily accessible for anyone interested in the topic. This is an important aspect of dissemination as it allows anyone to access and reproduce our research results, which is crucial for the scientific community to verify and build on our findings.

We also have an extensive online platform on Explainable AI for finance which includes several use cases, all papers, code repositories, interactive apps, see https://www.explainableaiforfinance.com/ which can be accessed by anyone interested in the topic.

Moreover, our GP3 has several dedicated Action meetings related to regulators, most notably the COST CA19130 meets Brussels event, hosted at the premises of the COST Association in Brussels. This event brings together high-level speakers from the European Commission and provides an opportunity for regulators and policymakers to learn about our research results and to engage with us in discussions.

All of these efforts have enabled us to disseminate our research results to the general public (1.i) and to stakeholders such as regulators (1.j) in an effective and comprehensive manner. We have always been open to any feedbacks and criticisms that can improve our research, our findings and our methods from the industry, academia and regulators. Overall, our COST Action CA19130 has been effective in disseminating our research results to a broad audience, and we continue to work closely with regulators, industry and academics to share our results and improve the application of AI in the investment industry. |

Mou objective	Creation of the first European platform comparing the out-of-sample performance of banks' investment products, insurance-linked investment products and asset management products available to the general public.

Type of objective	2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda
	2.b Building a community around a new or emerging field of research
Level of progress	51 - 75%
Description of progress with achieving the MoU objective	We are proposing to replace this objective with the following:
	Creation of a stable, transparent European platform for research on the digitalisation of Banks' financial products, including digital assets, tokens in a reproducible framework available to the general public.
	This new objective would have a substantially larger impact on the outcome of our COST Action and would be much better in line with academic, regulatory and industry developments since the start of the Action.
	The initial objective has fundamentally been dependent on regulatory changes in Europe to make this data available. Those changes have not happened. Therefore, purely from a legal point of view, it is not feasible to build this platform.
	In any case, the newly proposed objective is in line with the entire Action, the needs and requirements of all workings groups, all stakeholders and the future direction of any research in that area.
	Indeed, the newly proposed objective has been and is so fundamental to our Action, that we have already achieved a substantial part of it.

Mou objective	Create an excellent network of researchers in Europe with lasting collaboration beyond the lifetime of the Action.
Type of objective	1.h Input for future market applications (including cooperation with private enterprises)
	2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda
	2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	Our COST Action CA19130 has become one of the largest and most active COST Actions in all of Europe. Our network comprises 49 countries globally, of which 39 are European COST countries. We have more than 260 working group members now, with almost all countries represented in each working group.
	Our network is cooperating in many different ways and a substantial number of (changing) subgroups have formed that work on joint publications, research applications and output. We have initiated a meetup group, https://www.meetup.com/Fintech_AI_in_Finance/, with now more than 2000 members globally. Our more than 150 events so far have been attended by more than 7000 participants.
	To achieve this, we have implemented several strategies:
	Encouraging active participation from all members: We have made it a priority to ensure that all members are actively engaged in the network and have opportunities to contribute to research projects and events.
	Promoting interdisciplinary collaboration: Our network brings together researchers from a wide range of disciplines, including computer science, economics, finance, and mathematics. We have encouraged these researchers to work together on interdisciplinary projects, which has led to a more diverse range of perspectives and ideas.

Facilitating communication and knowledge sharing: We have set up a number of platforms, including the aforementioned meetup group, an email list, and a website, to make it easy for members to communicate and share information. This has helped to create a sense of community within the network.

Prioritizing funding opportunities: We have actively sought out and applied for funding opportunities to support the research projects and events of our members. This has not only provided financial resources, but also helped to create a sense of shared investment in the network's success.

Encourage the formation of sub-groups: Through the formation of sub-groups which work together on specific research area/output this helped members work together in more focused area of work and get to know each other on a deeper level and make real-world impact.

To continue beyond the lifetime of the Action, we plan to establish a permanent platform for our members to connect and collaborate on future projects. Additionally, we will actively promote the continued collaboration of our subgroups, and will help members identify funding opportunities to support future research. We will also work to establish long-term partnerships with industry partners, to support the translation of our research into practical applications.

All these efforts have contributed to the formation of a strong and resilient network of researchers who are not just working together during the lifetime of the action but will continue to collaborate on future projects. We are truly proud of what we have achieved in creating a network of excellent researchers in the field of fintech and AI in finance, and look forward to seeing the continued impact of our work in the years to come.

Mou objective	Bringing technological, quantitative and economic researchers together, to tackle future research that can only be done in an interdisciplinary setting, and getting actively involved in the blockchain and FinTech communities across Europe, to constantly monitor developments, get input and disseminate results.
Type of objective	1.e Development of knowledge needing international coordination, pertaining to a new or improved theory, model, methodology, technology or technique 2.b Building a community around a new or emerging field of research 2.d Acting as a stakeholder platform or trans-national practice community, pertaining to a certain area of socio-economical or societal application, or to a certain market sector
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	Our COST Action CA19130 has been designed to bring together technological, quantitative, and economic researchers in order to tackle future research that can only be done in an interdisciplinary setting. We are actively involved in the blockchain and Fintech communities across Europe, constantly monitoring developments, getting input, and disseminating results. Our network is truly interdisciplinary, covering all disciplines from finance, computer science, economics, etc. Our members are all actively involved in their national blockchain and Fintech communities. We are collectively working together with more than 20 Fintech associations across Europe, which is a testament to the significance of the impact of our action on those communities. In terms of the specific COST objectives, our COST Action CA19130 achieves the following: 1.e - Development of knowledge needing international coordination: Our network comprises 49 countries globally, of which 39 are European COST countries. This international representation allows for a wide range of perspectives and ideas to be brought together in order to tackle complex research questions that can only be

accomplished with an international coordination. 2.b - Building a community around a new or emerging field of research: Our more than 260 working group members, with almost all countries represented in each working group, and the more than 2000 members globally in the meetup group, https://www.meetup.com/Fintech_AI_in_Finance/, are a testament to the strong community we have built around fintech and AI in finance. 2.d - Acting as a stakeholder platform or trans-national practice community: Our network is cooperating in many different ways and a substantial number of subgroups have formed that work on joint publications, research applications, and output. This allows us to act as a stakeholder platform, bringing together the different perspectives and ideas of our members to tackle important research questions. Additionally, our work with more than 20 Fintech associations across Europe allows us to act as a trans-national practice community, disseminating our research results and providing input to the industry stakeholders.

All in all, our COST Action CA19130 has truly created a large network of excellent and interdisciplinary researchers across Europe and the globe that are actively involved in the national research agendas on blockchain and Fintech and are generally the leading academic partners in their respective countries. This action is a unique platform that is continuously working towards promoting and developing knowledge, research, and innovation in the field of fintech and AI in finance.

Mou objective	Bridging the gap between practitioners from the finance industry, academics and regulators by setting up a common knowledge exchange platform.
Type of objective	1.a Development of a common understanding/definition of the subject matter 2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	Our COST Action CA19130 has been designed to bridge the gap between practitioners from the finance industry, academics, and regulators by setting up a common knowledge exchange platform. To achieve this, we have organized more than 150 research events with more than 6000 participants, all coming from the academia, industry, and regulatory sectors. This has provided a unique opportunity for different stakeholders to come together and share their perspectives, ideas and experiences. In addition to these research events, we have also set up three platforms to facilitate the exchange of knowledge: quantlet.com: This is a platform that houses thousands of code pieces showcasing academic research, making it reproducible for everyone. This platform enables practitioners from the industry and other stakeholders to access and understand the latest academic research and apply it to their work.quantinar.com: This is a knowledge, training, and dissemination outlet, showcasing the fundamentals of our COST CA19130 Action as well as cutting-edge research. This platform provides a comprehensive overview of our Action's research agendas and enables practitioners from the industry and other stakeholders to learn about and stay informed of the latest developments in the field of fintech and AI in finance. The Blockchain research centre: This platform provides a substantial number of datasets to our COST Action as well as other stakeholders. This enables researchers to access a wealth of data and conduct rigorous research that can contribute to the understanding of blockchain and its applications in finance. In terms of the specific COST objectives, our COST Action CA19130 achieves the following: 1.a - Development of a common understanding/definition of the subject matter: The knowledge exchange platform we have set up allows for a common understanding and definition of the subject matter to be developed among practitioners from the finance

industry, academics and regulators. By providing a space for the sharing of ideas and perspectives, the platform enables all stakeholders to come to a shared understanding of the field of fintech and AI in finance, leading to better collaboration and cooperation.2.c - Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach: Our network is truly interdisciplinary, covering all disciplines from finance, computer science, economics, etc. Through the knowledge exchange platform, we have set up, we bring together practitioners from different fields and disciplines to work together on complex research questions that can only be accomplished with an interdisciplinary approach. This allows for breakthroughs in the field of fintech and AI in finance that would not be possible with a single-disciplinary approach.

In summary, our COST Action CA19130 is making an active effort to bridge the gap between practitioners from the finance industry, academics and regulators by setting up a common knowledge exchange platform. Through the 150+ research events, the quantlet.com, quantinar.com, and the Blockchain research centre, we are fostering an environment for the exchange of ideas, perspectives and knowledge that is promoting a shared understanding and cooperation among all the stakeholders. This is leading to breakthroughs that would not be possible otherwise.

Mou objective	Transfer knowledge in terms of expertise, scientific tools and human resources across the different disciplines and between academia and industry.
Type of objective	2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda 2.c Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	The COST Action on Fintech and AI in Finance has been highly successful in transferring knowledge in terms of expertise, scientific tools and human resources across different disciplines and between academia and industry. One of the key ways in which this has been achieved is through the organization of more than 150 research events, almost all of which were in an interdisciplinary setting and involved both industry and academia. This has provided a platform for researchers to present their latest findings, share ideas and collaborate on new projects, allowing for the transfer of knowledge and expertise across different disciplines and between academia and industry. The COST Action has also established several knowledge exchange platforms such as quantlet.com, quantinar.com, and the Blockchain research center (HU Berlin) which provide thousands of reproducible pieces of research and extensive training material to transfer knowledge. These platforms provide valuable resources for researchers, practitioners, and students to gain access to the latest research findings, tools, and methodologies in the field. Additionally, a substantial number of members work very closely with industry in their day-to-day research activities, which has helped to build strong partnerships between academia and industry and promotes the transfer of knowledge and expertise between the two sectors. This approach has led to the COST Action being one of the most active Actions across Europe. The network provides an opportunity to the researchers to share ideas, collaborate on research, and exchange knowledge and expertise, which has helped to advance the field of fintech and AI in finance in research, education, and practice. In short, the COST Action has achieved knowledge transfer by: Organizing more than 150 research events, almost all of them in an interdisciplinary setting and with both industry and academia involved. Establishing several knowledge exchange platforms, such as quantlet.com,

quantinar.com, and the Blockchain research center (HU Berlin) which provide thousands of reproducible pieces of research and extensive training material to transfer knowledge.

Building a strong partnership between academia and industry through a substantial number of members working closely with industry in their day-to-day research activities, this approach facilitates the transfer of knowledge and expertise between the two sectors and enables the implementation of the latest research findings in the industry.

Furthermore, the COST Action has developed an active community of researchers from different disciplines that has helped to promote interdisciplinary research, foster collaboration and collaboration and transfer knowledge across different fields.

The COST Action's success in transferring knowledge can be seen in the significant amount of output that has been widely disseminated and has achieved a high citation count. Furthermore, the Action's active engagement with the latest research and developments in the field, support for early-career researchers and initiatives to ensure research being conducted is inclusive and responsive to the needs of diverse stakeholders has helped to build an inclusive community of researchers that is able to adapt and respond to the changes and new challenges in the field.

Mou objective	Establish an inclusive community of researchers on methodological and technological themes in Machine Learning and Artificial Intelligence, to promote Early Career Investigators and increase their visibility.
Type of objective	2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda

2.b Building a community around a new or emerging field of research |
| Level of progress | 76 - 100% |
| Description of progress with achieving the MoU objective | This objective is similar to previous one. We are very likely one of the largest and most definitely one of the most active research networks on Fintech and AI in Finance in all of Europe.

During the first part of this Action, our members/ ECIs have received a substantial number of promotions, we have had more than 20 PhD thesis finished as well as more than 10 promotions on different levels of professorships.

ECIs are visible in a prominent way in our Action, all funding for activities is prioritisized towards ECIs.

Furthermore, the COST Action on Fintech and AI in Finance has established an inclusive community of researchers on methodological and technological themes in Machine Learning and Artificial Intelligence (ML/AI). The action has made a concerted effort to promote Early Career Investigators (ECIs) and increase their visibility over the last two years.

To promote ECIs, the Action has taken a number of steps to ensure that they are represented and included in all aspects of the network's activities. For example, the Action has supported the connections between ECIs and more experienced colleagues, providing them with the support and guidance they need to develop their research and career. Additionally, the Action has also established a number of initiatives to support the participation of ECIs in conferences, workshops, and other events, and has provided opportunities for ECIs to present their work and receive feedback from more experienced researchers.

The Action also has established a number of working groups and task forces, which focus on specific areas of ML/AI research, in particular Working groups 1,2, and 3 and our substantial diversity team. These working groups and task forces are led by experienced researchers and provide opportunities for ECIs to collaborate and share their expertise with more experienced colleagues. This approach has helped to increase the visibility and profile of ECIs within the network and the wider community. |

The Action has also made a concerted effort to ensure that the research being conducted is inclusive and addresses the needs of a diverse range of stakeholders. For example, it has established guidelines and best practices for conducting inclusive research, and it has also taken steps to ensure that the research being conducted is responsive to the needs of ECIs and under-represented groups.

Overall, the COST Action has established an inclusive community of researchers on methodological and technological themes in ML/AI, by promoting Early Career Investigators, increasing their visibility and establishing initiatives to support their participation and career development in the field. Additionally, the Action has put in place a number of measures to ensure that the research being conducted is inclusive, responsive and addresses the needs of diverse range of stakeholders in the field.

Mou objective	Overcome the siloing of research topics by country and achieve geographical and demographical diversity, with special attention to COST Inclusiveness Target countries.
Type of objective	2.d Acting as a stakeholder platform or trans-national practice community, pertaining to a certain area of socio-economical or societal application, or to a certain market sector 2.e Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	The COST Action CA19130 (FinAI) aims to overcome the siloing of research topics by country and achieve geographical and demographical diversity, with special attention to COST Inclusiveness Target countries (ITC). To achieve this, the FinAI diversity team promotes diversity within the COST Action and suggests improvements to the Management Committee (MC). As of the end of 2022, FinAI included 246 members from 49 different countries, with 22 of those countries being ITC (out of 39 COST countries). Overall, the action included 260 members, with 53% of those members being from ITC. In all the three working groups (WGs), ITC members are more than non-ITC members. In the MC, out of 71 members, 17 are young researchers (24%), 39 are from ITC (55%). Out of the 4 Virtual Mobility Grants (VMGs) granted in the first grant period (GP1), all were for ITC members, and in GP2 out of the 9 VMGs granted, 5 were for ITC members. Young researchers represent 41.3% of all members, with 97 young researchers who are both female (40) and male (57). Albania and Romania (both ITC) have the highest number of Early Career Investigators (ECI) with 9 out of 17 Albanian members and 10 out of 12 Romanian members. The WGs include researchers with diverse backgrounds including econometrics, statistics, mathematics, engineering, computer science, economics, banking, finance, business, and law. The research collaboration occurs between groups of members related to COST FinAI. Additionally, COST networking tools and grants provide the basis for collaboration on other topics and streams of research outside the scope of the network. To improve diversity in events, FinAI has established guidelines to improve the gender balance, country and age of participants and organizers. For the next GP, the following measures will be taken: Establish instruments to incentivize ITC members to participate in events organized by FinAI members by prioritizing reimbursement for young researchers for conference expenses such as travel and accommodation. Promote instruments to incentivize young researchers to participate in events organized by FinAI members by prioritizing reimbursement for their conference expenses such as travel and accommodation.

Keep track of memberships to improve young researchers' presence in all countries, but especially in those that currently have a lower presence of young researchers within the action.

Overall, COST Action CA19130 FinAI has put in place various measures to achieve geographical and demographical diversity with special attention to ITC countries and Young researcher, to achieve this objective and to empower young researcher from diverse backgrounds to collaborate and to have equal opportunities in networking and knowledge sharing.

Mou objective	Prepare competitive European researchers for a fruitful career in an international environment through intensive use of Short Term Scientific Missions (STSM) and joint educational programs with industrial partners.
Type of objective	2.a Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda 2.d Acting as a stakeholder platform or trans-national practice community, pertaining to a certain area of socio-economical or societal application, or to a certain market sector
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	Our COST Action CA19130 has been highly successful in preparing competitive European researchers for a fruitful career in an international environment through the intensive use of Short Term Scientific Missions (STSM) and joint educational programs with industrial partners. STSMs have been a central component of our Action, allowing early-career researchers to gain valuable international experience by visiting other research institutions and collaborating on research projects. This has not only enabled them to broaden their expertise, but also to establish valuable connections and collaborations that have the potential to continue beyond the lifetime of the Action. In addition to STSMs, we have also established joint educational programs with industrial partners. This has allowed researchers to gain hands-on experience working on real-world projects and to develop valuable skills that are in high demand in the industry. Furthermore, these educational programs have provided researchers with an understanding of the practical applications of the research, which is essential for the development of a joint research agenda. By providing researchers with these opportunities, we have been able to build a community around a topic of scientific and socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda (2.a). Our community comprising of over 260 working group members now, have represented almost all countries, and worked on many different ways and formed a substantial number of (changing) subgroups, which work on joint publications, research applications and output. Furthermore, we have also acted as a stakeholder platform or trans-national practice community, pertaining to a certain area of socio-economical or societal application, or to a certain market sector (2.d). Our research focuses on the financial industry and the development of cutting-edge technology such as Artificial Intelligence and Blockchain. By bringing together researchers from various disciplines including finance, computer science, and economics, we have been able to address the complex challenges facing the industry and provide valuable insights and solutions to regulators and practitioners. Our members are actively involved in their national blockchain and Fintech communities, and we are collectively working together with more than 20 Fintech associations across Europe. In addition to our research and educational programs, we have also been very successful in disseminating our results to the public and sharing them with regulators through events and publications. This has helped to promote transparency and understanding of the applications of artificial intelligence in the financial industry, and

has provided valuable input for future market applications.

Overall, our COST Action CA19130 has been highly successful in preparing competitive European researchers for a fruitful career in an international environment, and in bringing together researchers, regulators, and practitioners to address the complex challenges facing the financial industry. Our Action provides a great platform for researchers to share their knowledge, develop cutting-edge technologies and gain invaluable professional skills.

Mou objective	Maximize the job opportunities for PhD students and Early Career Investigators.
Type of objective	2.d Acting as a stakeholder platform or trans-national practice community, pertaining to a certain area of socio-economical or societal application, or to a certain market sector
	2.e Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	Our COST Action CA19130 has been highly successful in maximizing job opportunities for PhD students and Early Career Investigators (ECIs). We have a substantial number of PhD students in our network, and we are extremely inclusive and open for cooperation. This means that all PhD students can freely approach anyone in our network and receive input and guidance on their research.

In addition to providing guidance, we actively support our PhD students and ECIs in their career progression. We have had a lot of successful PhD defenses and our ECIs and PhD students have been promoted to postdocs and different professorship levels. This has provided them with a great platform for them to gain invaluable professional skills and develop their careers in an international environment.

Our Action is also designed to be a stakeholder platform that brings together researchers, regulators, and practitioners to address the complex challenges facing the financial industry. This multidisciplinary approach helps our PhD students and ECIs gain diverse perspectives, which is crucial to their professional development.

Furthermore, we have also been making a conscious effort to build capacity in the demographic inclusiveness of networks in science and technology. Our network comprises 49 countries globally, of which 39 are European COST countries, and we have representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action.

Overall, our COST Action CA19130 is designed to maximize job opportunities for PhD students and Early Career Investigators. With our inclusive and open network and our focus on career development, we are confident that we have provided them with the best platform to gain valuable professional skills and develop their careers in an international environment. |

Mou objective	Disseminate the results of the Action's activities to the scientific community, European institutions and to the general public.
Type of objective	1.i Dissemination of research results to the general public
	1.j Dissemination of research results to stakeholders (excluding specific input in view of knowledge application)
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	Our COST Action CA19130 has always placed a strong emphasis on dissemination and ensuring that the results of our research are made available to the widest possible audience. From the start of our Action, we have organized over 150 research

conferences and events, with more than 6,000 participants in total, making it one of the most active COST Actions in Europe. These events have been designed to bring together researchers from academia, industry, and regulators to share their knowledge and insights on the latest developments in the field of Fintech and AI in finance. The list of all events can be found at https://www.meetup.com/Fintech_AI_in_Finance/.

In addition to organizing events, we have also made sure that our research results are widely disseminated through various digital platforms. For example, we have created two platforms, quantlet.com and quantinar.com, where thousands of self-contained code pieces showcasing academic research are made available to the public, making it easy for anyone to reproduce and build upon our research. Furthermore, we have also created an extensive platform on Explainable AI for finance, which includes several use cases, all papers, code repositories, interactive apps, and so on. This platform can be accessed at https://www.explainableaiforfinance.com/

We have also established partnerships with several European institutions and organizations, such as the European Commission, the Confederation of European Data Protection Organizations, and the European Central Bank, to ensure that our research results reach the widest possible audience. Additionally, many of our members are actively working with industry partners, and our research output is regularly discussed and challenged by leading international companies such as ING Group and various national banks.

In GP3 we will be organizing a high-level COST policy event at the premises of the COST Association in Brussels, where representatives from the European Commission will be participating, along with other key stakeholders. This event will provide us with an opportunity to present our research results and receive feedback from regulators and policy-makers.

Overall, our COST Action CA19130 has made sure that the results of our research are disseminated to the scientific community, European institutions, industry partners and the general public. We believe that by making our research available to everyone, it will have a greater impact and contribute to the advancement of knowledge in the field of Fintech and AI in finance.

Mou objective	Significantly improve the gender equality in the fields of the Action.
Type of objective	2.e Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action
Level of progress	76 - 100%
Description of progress with achieving the MoU objective	The COST Action CA19130 (FinAI) aims to significantly improve gender equality in the fields of the action. To achieve this, the FinAI diversity team promotes diversity within the COST Action and suggests improvements to the Management Committee (MC). As of the end of the second grant period (GP2), the gender representation among FinAI members is as follows: 41% female and 56% male. Within the working groups (WGs), female presence is as follows: WG1 47%, WG2 33%; WG3 40%. In the MC, 33 members are female (46%), which is in line with the overall membership of the action. This figure has increased since the end of GP1, when it was 44%. In terms of Virtual Mobility Grants (VMGs) granted, in GP1, out of the 4 VMGs, 3 were granted to female researchers; in GP2, out of the 9 VMGs granted, 8 were for female researchers. For the organization of events, FinAI has established guidelines to improve diversity in terms of gender balance, country, and age of participants and organizers. For example, guidelines state: "Respect that the organizing committee and the scientific committee are composed according to criteria for gender balance", "If there is more than one keynote speaker, choose a scholar belonging to the underrepresented gender in that specific event", "Avoid involving women only in the roles of moderators or session

chairs during events, workshops or conferences." "Avoid assigning to women only duties or tasks considered as "academic households", tasks that are time-consuming but do not give opportunity for women to be involved in research activities." Members of COST participating on the organizing committee make sure these guidelines are respected whenever possible.

To improve gender equality in the field, the COST Action CA19130 FinAI is constantly monitoring the gender representation among its members and taking specific measures to increase the presence of female members in the working groups, management committee and in the organization of events. The virtual mobility grants is also been given to female researcher which is one of the important measure to empower and support female researcher in the field of FinAI.

In addition to the measures mentioned above, COST Action CA19130 FinAI also promotes the participation and leadership of female members through various initiatives such as:

Encouraging the nomination of female members for leadership roles within the action such as working group leaders, management committee members and coordinators.

Offering mentorship and networking opportunities for female members to connect with experienced researchers in the field and to help them to develop the skills needed to take on leadership roles.

Organizing training and development workshops specifically tailored to the needs of female members to help them to build their skills and confidence in their field.

In summary, COST Action CA19130 FinAI has put in place various measures and initiatives to significantly improve gender equality in the fields of the action. The Action is being monitored and evaluated regularly to see the impact of the measures and to make necessary adjustments, with the goal of creating an inclusive and equitable environment for all members regardless of their gender.

Deliverables

This section covers only deliverables that were foreseen for the Action, not additional outputs that were generated during the Action (these additional outputs will be added in the following section). Please select and comment on the progress with achieving each deliverable.

For deliverables that are:

- Delivered, please provide proof to enable the Action Rapporteur to confirm the delivery
- Not delivered but delivery is foreseen within 2 years please explain how the delivery will be achieved
- Not foreseen to be delivered please explain why not

Deliverable	A database which contains pre-ICO documentation and post-ICO performance (ROI and lifespan)		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	24
Proof of progress with achieving the deliverable	https://doi.org/10.3389/frai.2021.718450		
Explanation	The data protection regulations in Europe and around the world have become significantly stricter over the course of the Action. To respond to this changing landscape, we have expanded the scope of our deliverable and made a substantially larger number of datasets related to this topic available through the Blockchain Research Center, founded by WG1 leader, Professor Härdle at HU Berlin. The database can be accessed at the following link: https://blockchain-research-center.com/blockchain-explorer/. The goal is to provide a comprehensive resource for researchers and practitioners working in the field of blockchain and data protection, and to foster new research in this area.		

Deliverable	A database which contains data on crowdfunding/P2P platform features useful for rating platform integrity and to predict fraud		
Progress with achieving deliverable	Delivered	Month deliverable due	24
Proof of progress with achieving the deliverable	https://drive.google.com/drive/folders/1qJmo2T0VeOojtC4037mmukyaEIP2IGNP		

Deliverable	Discussion papers (DP) on the methodology for evaluating/rating ICOs and crowdfunding/P2P platforms and for detection/early warning about fraud/illegal behaviour with emphasis on the application of AI tools		
Progress with achieving deliverable	Not delivered, but expected before end of Action	Month deliverable due	36
Proof of progress with achieving the deliverable	https://fin-ai.eu/		
Explanation	Substantial research has been undertaken by members of the Action to develop this deliverable. The DPs will be written by a consortium of the members and submitted to peer-reviewed journals for publication. In particular, Action meetings will be used as an opportunity for the members to collaborate and jointly write the papers. We are still working on finalizing the research and writing the papers, but substantial progress has been made, and we expect to have the papers submitted for review in the coming months.		

Deliverable	A position paper and roadmap on mitigating risks connected with the increased use of digital assets		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	48
Proof of progress with achieving the deliverable	https://doi.org/10.3389/frai.2021.718450		
Explanation	Substantial research has been undertaken by members of the Action to develop this deliverable. The position paper will be written by a consortium of the members and submitted to peer-reviewed journals for publication. The members have been using Action meetings as an opportunity to collaborate and jointly write the paper. The position paper will also be presented at one of the Action meetings with a focus on policy implications, which is planned for GP3 in May 23 at the COST Association in Brussels. Substantial progress has been made, and we expect to have the papers submitted for review soon.		

Deliverable	A discussion paper for possible approaches to building a statistically valid back-testing framework		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	24
Proof of progress with achieving the deliverable	https://doi.org/10.1016/j.ijforecast.2021.11.001		
Explanation	We are currently working on a deliverable for a discussion paper for possible approaches to building a statistically valid back-testing framework. Substantial research has been undertaken by Action members as confirmed by many academic publications, and the Action members have been collaborating to develop this deliverable. The discussion paper will be written by a consortium of the members and submitted to a peer-reviewed journal. The members are using Action meetings as an opportunity to collaborate and jointly write the paper. We are still in the process of finalizing the research and preparing the paper for submission.		

Deliverable	Methodological discussion paper on the design of stress tests for the evaluation of AI and ML models under shifting financial conditions to improve the robustness of models		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	48
Explanation	We are currently in the final stages of completing this deliverable. We have already finished all the research and gathered all the necessary information. Now, we are working on framing the research findings into a discussion paper. The paper will be submitted to a peer-reviewed journal and also presented at various COST conferences to gather feedback and further contributions from the experts in the field. The aim of this discussion paper is to provide a comprehensive methodology for conducting stress tests on AI and ML models, and to promote the robustness and reliability of these models in financial applications.		

Deliverable	Position papers, aimed at regulators and policy-makers, on methodology (with examples of formal criteria) for testing AI techniques in real-time		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	36
Explanation	Substantial research has been undertaken by Action members as confirmed by many academic publications. The position paper will be written by a consortium of the members and submitted to a peer-reviewed journal. In particular, Action meetings will be used to jointly write the paper. Since the EU has released their AI strategy at the end of 2022, we will aim to relate our paper to that strategy.		

Deliverable	Report on good examples and best practices for a transparent finance industry with guidelines to improve transparency		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	12
Proof of progress with achieving the deliverable	https://fincrime.net/en/platform		
Explanation	Substantial research has been undertaken by Action members as confirmed by many academic publications. The report paper will be written by a consortium of the members and submitted to a peer-reviewed journal. In particular, the first Action meeting of GP3 in Cluj-Napoca in February 2023 will be used to finalize this report. We will then disseminate it via social media outlets and a peer-reviewed journal, likely Open Research Europe.		

Deliverable	An internal database of collected (scraped) financial time series from exchanges and regional consolidation platforms optimised for accessibility to all partners		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	24
Proof of progress with achieving the deliverable	https://blockchain-research-center.com/		
Explanation	Data protection rules in Europe and globally basically do not allow us to create such databases. We have created several databases under the auspices of the Blockchain Research Centre, founded by Prof. Härdle, WG1, which are in line with data protection policies. The data protection rules in Europe and globally have become substantially stricter during the lifetime of the Action. We have extended the scope of this deliverable and made substantially larger number of datasets related to this topic available, via the Blockchain Research center and its database, founded by Working Group 1 leader, Prof. W. Härdle, HU Berlin: https://blockchain-research-center.com/blockchain-explorer/		

Deliverable	Methodological discussion papers on AI models to generate "failed trials" of investment product producers and on quantitative strategies with the usage of the promising field of network data analysis		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	48
Explanation	Substantial research has been undertaken by Action members as confirmed by many academic publications. The discussion paper will be written by a consortium of the members and submitted to a peer-reviewed journal. In particular, the Action meeting of GP3 in Tirana will be used to finalize this paper. We will then disseminate it via social media outlets and a peer-reviewed journal, likely Open Research Europe.		

Deliverable	Four annual reports (for lay audience) distributed via local and national media		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	48
Explanation	We are currently working on producing four annual reports for a lay audience, which will be distributed via local and national media. These reports will provide detailed information and analysis of the progress and outcomes of the Action. Several members are in the process of raising additional funds to support the production of these reports. The reports will be written by a consortium of our members and we are working hard to ensure the reports will be high quality, and valuable to the general public.		

Deliverable	Key software (codes, packages) developed by each of the Working Groups in line with their objectives		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	48
Proof of progress with achieving the deliverable	https://www.blackseachain.com/		
Explanation	We are developing a deliverable for key software (codes, packages) developed by each Working Group. Researchers have been storing their code and software on Github, and for better accessibility, a software and dissemination platform, http://quantinar.com/ has been created. It also includes access to data sources, programming code, and presentations. Furthermore, quantlet.com has also been created, a platform that collects thousands of packages of academic software code, enabling reproducibility and transparency of research.		

Deliverable	Handbook and/or wiki page describing potential approaches to tackle risk management issues related to blockchain assets and crowdfunding/P2P lending		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	36
Proof of progress with achieving the deliverable	https://blockchain-research-center.com		
Explanation	We are currently working on a deliverable for a handbook and/or wiki page describing potential approaches to tackle risk management issues related to blockchain assets and crowdfunding/P2P lending. To make it more comprehensive, we will split that into two handbooks, one focusing on Blockchain Assets and the other focusing on Crowdfunding/P2P lending. The handbooks will be written by a consortium of the members, and several Action meetings in GP3 will be used to finalize the handbooks and provide guidance for members. We are making progress on the development of the handbooks and expect to have them finalized and available soon.		

Deliverable	An edited volume containing scientific achievements of the Action (dummy text to delete)		
Progress with achieving deliverable	Not delivered, but expected within 2 years after the end of the Action	**Month deliverable due**	48
Proof of progress with achieving the deliverable	https://wiki.fin-ai.eu/index.php/Main_Page		
Explanation	This volume will be edited by consortium members, with a substantial number of Action members contributing to it. Our aim is to deliver it by the end of the Action. However, since the Action runs until September 2024 and we want to include all the achievements, finishing this volume might go beyond the end date of the Action. We are in the process of collecting and compiling the scientific achievements, and will continue to work on the edited volume throughout the duration of the Action. We hope that the volume will provide a comprehensive overview of the Action's research outcomes.		

Deliverable	Strategy to engage stakeholders in the Action (including revisions in month 24 and 36)		
Progress with achieving deliverable	Not delivered, but expected before end of Action	**Month deliverable due**	6
Proof of progress with achieving the deliverable	https://fintech-ho2020.eu/wp-content/uploads/2021/04/Suptech-BC-Ireland.pdf?fbclid=Iw AR0o3JSeUWdLsFgt357lHXroLYweNsSYbbnn7e6GXntT0soPPiMnFJtRVrw		

Explanation	The strategy is being developed by the Action members with the goal of identifying, engaging and involving stakeholders in the Action's research, development and implementation. This can include identifying key stakeholders and groups such as policy makers, industry, civil society, and academics. We are currently in the process of identifying key stakeholders and developing strategies to engage with them. The revisions that will be made in month 24 and 36 will help us to review our engagement strategy and adapt it as needed in light of the feedback from stakeholders and the progress made so far in the Action.

Additional outputs / achievements

Co-authored Action publications

Please enter below ONLY publications (including publications that are submitted but not yet accepted):

- that are on the topic of the Action, and
- that are co-authored by at least two Action participants from two countries participating in the Action, and
- for which the Action networking was necessary.

Please pay special attention to the COST Excellence and Inclusiveness policy and ensure the inclusion of publications with authors from COST Inclusiveness Target Countries (ITCs), from the underrepresented gender in the Action and from Early Career Investigators/Young researchers.

	Bibliographic data		Countries participating in the Action among authors	Open Access	COST cited?	COST funds?	Relevance to H2020 Societal challenge	Peer Reviewed?
1	doi:10.1007/978-981-16-2418-6 Title Author DOI Type Published in Published by ISSNs Links	Data Science Techniques for Cryptocurrency Blockchains Innar Liiv doi:10.1007/978-981-16-2418-6 Book Behaviormetrics: Quantitative Approaches to Human Behavior Springer Singapore 2524-4027; 2524-4035 https://link.springer.com/content/pdf/10.1007/978-981-16-2418-6.pdf; https://link.springer.com/content/pdf/10.1007/978-981-16-2418-6		Other	Y	Y		Y
2	doi:10.1016/j.frl.2021.102162 Title Authors DOI Type Published in	Shall the winning last? A study of recent bubbles and persistence Akanksha Jalan; Roman Matkovskyy; Valerio Potì doi:10.1016/j.frl.2021.102162 Journal article Finance Research Letters	FR, IE	Y	Y	Y	Secure societies, protecting freedom and security of Europe and its citizens	Y

	Published by ISSN Subject Links	Elsevier BV 1544-6123 Finance https://api.elsevier.com/content/article/PII:S1544612321002415?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S1544612321002415?httpAccept=text/plain						
3	doi:10.1016/j.econlet.2022.110877 Title Authors DOI Type Published in Published by ISSN Subjects Links	Demand elasticities of Bitcoin and Ethereum Akanksha Jalan; Roman Matkovskyy; Andrew Urquhart doi:10.1016/j.econlet.2022.110877 Journal article Economics Letters Elsevier BV 0165-1765 Economics and Econometrics; Finance https://api.elsevier.com/content/article/PII:S0165176522003512?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0165176522003512?httpAccept=text/plain	FR, UK	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
4	doi:10.1007/s42521-021-00045-3 Title Authors DOI Type Published in Published by ISSNs	COVID risk narratives: a computational linguistic approach to the econometric identification of narrative risk during a pandemic Yuting Chen; Don Bredin; Valerio Potì; Roman Matkovskyy doi:10.1007/s42521-021-00045-3 Journal article Digital Finance Springer Science and Business Media LLC 2524-6984; 2524-6186	FR, IE	Y	Y	Y	Health, demographic change and wellbeing	Y

	Subject Links	General Engineering https://link.springer.com/content/pdf/10.1007/s42521-021-00045-3.pdf; https://link.springer.com/article/10.1007/s42521-021-00045-3/fulltext.html						
5	doi:10.1007/978-3-030-73443-5_94-1 Title Authors DOI Type Published in Published by Link	Tail-Risk Protection: Machine Learning Meets Modern Econometrics Bruno Spilak; Wolfgang Karl Härdle doi:10.1007/978-3-030-73443-5_94-1 Book chapter Encyclopedia of Finance Springer International Publishing https://link.springer.com/content/pdf/10.1007/978-3-030-73443-5_94-1	CZ, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
6	doi:10.48550/arXiv.2208.12614 Title Authors DOI Type Published by	Regime-based Implied Stochastic Volatility Model for Crypto Option Pricing Danial Saef; Yuanrong Wang; Tomaso Aste doi:10.48550/arXiv.2208.12614 Article arXiv	DE, UK	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
7	doi:10.1016/j.ribaf.2021.101594 Title Authors DOI Type Published in Published by ISSN Subjects Links	Financial Risk Meter for emerging markets Souhir Ben Amor; Michael Althof; Wolfgang Karl Härdle doi:10.1016/j.ribaf.2021.101594 Journal article Research in International Business and Finance Elsevier BV 0275-5319 Finance; Business, Management and Accounting (miscellaneous) https://api.elsevier.com/content/article/PII:S0275531921002154?httpAccept=text/xm	CZ, DE	Y	Y	Y	Secure societies, protecting freedom and security of Europe and its citizens	Y

	l; https://api.elsevier.com/content/article/PII:S0275531921002154?httpAccept=text/plain						
8	doi:10.2139/ssrn.3809329 Title Authors DOI Type Published in Published by ISSN	Financial Risk Meter Based on Expectiles Rui Ren; Meng-Jou Lu; Yingxing Li; Wolfgang K. Härdle doi:10.2139/ssrn.3809329 Journal article SSRN Electronic Journal Elsevier BV 1556-5068	CZ, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
9	doi:10.48550/arXiv.2107.08808 Title Authors DOI Type Published by	A Data-driven Explainable Case-based Reasoning Approach for Financial Risk Detection Wei Li; Florentina Paraschiv; Georgios Sermpinis doi:10.48550/arXiv.2107.08808 Article arXiv	NO, CH, UK	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
10	doi:10.2139/ssrn.3911490 Title Authors DOI Type Published in Published by ISSN	Bankruptcy Prediction of Privately Held SMEs Using Feature Selection Methods Florentina Paraschiv; Markus Schmid; Ranik Raaen Wahlstrøm doi:10.2139/ssrn.3911490 Journal article SSRN Electronic Journal Elsevier BV 1556-5068	FR, NO, CH	Y	Y	Y	Secure societies, protecting freedom and security of Europe and its citizens	Y
11	doi:10.1007/s42521-022-00048-8 Title Authors	Indices on cryptocurrencies: an evaluation Konstantin Häusler; Hongyu Xia		Other	Y	Y		Y

	DOI Type Published in Published by ISSNs Subject Links	doi:10.1007/s42521-022-00048-8 Journal article Digital Finance Springer Science and Business Media LLC 2524-6984; 2524-6186 General Engineering https://link.springer.com/content/pdf/10.1007/s42521-022-00048-8.pdf; https://link.springer.com/article/10.1007/s42521-022-00048-8/fulltext.html						
12	doi:10.1007/s10614-021-10113-w Title Authors DOI Type Published in Published by ISSNs Subjects Links	A Comparative Analysis of Parsimonious Yield Curve Models with Focus on the Nelson-Siegel, Svensson and Bliss Versions Ranik Raaen Wahlstrøm; Florentina Paraschiv; Michael Schürle doi:10.1007/s10614-021-10113-w Journal article Computational Economics Springer Science and Business Media LLC 0927-7099; 1572-9974 Computer Science Applications; Economics, Econometrics and Finance (miscellaneous) https://link.springer.com/content/pdf/10.1007/s10614-021-10113-w.pdf; https://link.springer.com/article/10.1007/s10614-021-10113-w/fulltext.html	NO, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
13	doi:10.2139/ssrn.3987941 Title Authors DOI Type Published in Published by	Robustifying Markowitz Yegor Klochkov; Alla Petukhina; Wolfgang K. Härdle; Nikita Zhivotovskiy doi:10.2139/ssrn.3987941 Journal article SSRN Electronic Journal Elsevier BV	CZ, DE, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y

	ISSN	[1556-5068](1556-5068)						
14	doi:10.2139/ssrn.4209433		CZ, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	N
	Title	A Data-driven Case-based Reasoning in Bankruptcy Prediction						
	Authors	Wei Li; Wolfgang K. Härdle; Stefan Lessmann						
	DOI	doi:10.2139/ssrn.4209433						
	Type	Journal article						
	Published in	SSRN Electronic Journal						
	Published by	Elsevier BV						
	ISSN	[1556-5068](1556-5068)						
	Subjects	General Earth and Planetary Sciences; General Environmental Science						
15	[doi:10.1142/S0217590822480010](doi:10.1142/S0217590822480010)		CZ, DE	Y	Y	N	Secure societies, protecting freedom and security of Europe and its citizens	Y
	Title	FINANCIAL RISK METER FOR CRYPTOCURRENCIES AND TAIL RISK NETWORK-BASED PORTFOLIO CONSTRUCTION						
	Authors	RUI REN; MICHAEL ALTHOF; WOLFGANG KARL HÄRDLE						
	DOI	[doi:10.1142/S0217590822480010](doi:10.1142/S0217590822480010)						
	Type	Journal article						
	Published in	The Singapore Economic Review						
	Published by	World Scientific Pub Co Pte Ltd						
	ISSNs	[0217-5908](0217-5908); [1793-6837](1793-6837)						
	Subject	Economics and Econometrics						
	Link	https://www.worldscientific.com/doi/pdf/10.1142/S0217590822480010						
16	doi:10.48550/arXiv.2108.05721		CZ, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Networks of News and Cross-Sectional Returns						
	Authors	Junjie Hu; Wolfgang Karl Härdle						
	DOI	doi:10.48550/arXiv.2108.05721						
	Type	Article						
	Published by	arXiv						

17	doi:10.1016/j.jmva.2021.104869		CZ, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	K-expectiles clustering						
	Authors	Bingling Wang; Yingxing Li; Wolfgang Karl Härdle						
	DOI	doi:10.1016/j.jmva.2021.104869						
	Type	Journal article						
	Published in	Journal of Multivariate Analysis						
	Published by	Elsevier BV						
	ISSN	0047-259X						
	Subjects	Statistics, Probability and Uncertainty; Numerical Analysis; Statistics and Probability						
	Links	https://api.elsevier.com/content/article/PII: S0047259X21001470?httpAccept=text/xml; https://api.elsevier.com/content/article/PII: S0047259X21001470?httpAccept=text/plain						
18	doi:10.2139/ssrn.4079006		CZ, DK, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Uniform Confidence Bands for Generalized Random Forests						
	Authors	Kainat Khowaja; Chen Huang; Wolfgang K. Härdle						
	DOI	doi:10.2139/ssrn.4079006						
	Type	Journal article						
	Published in	SSRN Electronic Journal						
	Published by	Elsevier BV						
	ISSN	1556-5068						
19	doi:10.48550/arXiv.2204.02757		CZ, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Does non-linear factorization of financial returns help build better and stabler portfolios?						
	Authors	Bruno Spilak; Wolfgang Karl Härdle						
	DOI	doi:10.48550/arXiv.2204.02757						
	Type	Article						
	Published by	arXiv						

20	doi:10.1007/s00181-021-02027-1		CZ, DE, UK	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	The common and specific components of inflation expectations across European countries						
	Authors	Shi Chen; Wolfgang Karl Härdle; Weining Wang						
	DOI	doi:10.1007/s00181-021-02027-1						
	Type	Journal article						
	Published in	Empirical Economics						
	Published by	Springer Science and Business Media LLC						
	ISSNs	0377-7332; 1435-8921						
	Subjects	Economics and Econometrics; Social Sciences (miscellaneous); Mathematics (miscellaneous); Statistics and Probability						
	Links	https://link.springer.com/content/pdf/10.1007/s00181-021-02027-1.pdf; https://link.springer.com/article/10.1007/s00181-021-02027-1/fulltext.html						
21	doi:10.2139/ssrn.4150849		CZ, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Hedging Cryptos with Bitcoin Futures						
	Authors	Francis Liu; Natalie Packham; Meng-Jou Lu; Wolfgang K. Härdle						
	DOI	doi:10.2139/ssrn.4150849						
	Type	Journal article						
	Published in	SSRN Electronic Journal						
	Published by	Elsevier BV						
	ISSN	1556-5068						
22	doi:10.48550/arXiv.2110.09429		DE, HU	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Understanding jumps in high frequency digital asset markets						
	Authors	Danial Saef; Odett Nagy; Sergej Sizov; Wolfgang Karl Härdle						
	DOI	doi:10.48550/arXiv.2110.09429						
	Type	Article						
	Published by	arXiv						

23	doi:10.48550/arXiv.2108.11921 Title Authors DOI Type Published by	A Time-Varying Network for Cryptocurrencies Li Guo; Wolfgang Karl Härdle; Yubo Tao doi:10.48550/arXiv.2108.11921 Article arXiv		Other	Y	Y		Y
24	doi:10.6293/AQAFA.202112_(18).0006 Title Authors DOI Type Published in	BLOCKCHAIN MECHANISM AND DISTRIBUTIONAL CHARACTERISTICS OF CRYPTOS Min-Bin Lin; Kainat Khowaja; Cathy Yi-Hsuan Chen; Wolfgang Karl Härdle doi:10.6293/AQAFA.202112_(18).0006 Journal article Advances in Quantitative Analysis of Finance and Accounting		Other	Y	Y		Y
25	doi:10.2139/ssrn.3912753 Title Authors DOI Type Published in Published by ISSN	A Data-driven Explainable Case-based Reasoning Approach for Financial Risk Detection Wei Li; Florentina Paraschiv; Georgios Sermpinis doi:10.2139/ssrn.3912753 Journal article SSRN Electronic Journal Elsevier BV 1556-5068		Other	Y	Y		Y
26	doi:10.48550/arXiv.2103.08447 Title Authors DOI Type Published by	Understanding Smart Contracts: Hype or Hope? Elizaveta Zinovyeva; Raphael C. G. Reule; Wolfgang Karl Härdle doi:10.48550/arXiv.2103.08447 Article arXiv		Other	Y	Y		Y

27	doi:10.1007/s42521-022-00064-8			Other	Y	Y		Y
	Title	Discussion on: "Programmable money: next generation blockchain-based conditional payments" by Ingo Weber and Mark Staples						
	Author	Michael C. Burda						
	DOI	doi:10.1007/s42521-022-00064-8						
	Type	Journal article						
	Published in	Digital Finance						
	Published by	Springer Science and Business Media LLC						
	ISSNs	2524-6984; 2524-6186						
	Subject	General Engineering						
	Links	https://link.springer.com/content/pdf/10.1007/s42521-022-00064-8.pdf; https://link.springer.com/article/10.1007/s42521-022-00064-8/fulltext.html						
28	doi:10.1016/j.jcomm.2021.100189			Other	Y	Y		Y
	Title	Modelling the evolution of wind and solar power infeed forecasts						
	Authors	Wei Li; Florentina Paraschiv						
	DOI	doi:10.1016/j.jcomm.2021.100189						
	Type	Journal article						
	Published in	Journal of Commodity Markets						
	Published by	Elsevier BV						
	ISSN	2405-8513						
	Subjects	Economics and Econometrics; Finance						
	Links	https://api.elsevier.com/content/article/PII:S2405851321000234?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S2405851321000234?httpAccept=text/plain						
29	doi:10.48550/arXiv.2101.10189		DE, IT, UA	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Surrogate Models for Optimization of Dynamical Systems						
	Authors	Kainat Khowaja; Mykhaylo Shcherbatyy; Wolfgang Karl Härdle						
	DOI	doi:10.48550/arXiv.2101.10189						

	Type Published by	Article arXiv						
30	doi:10.48550/arXiv.2108.11915 Title Authors DOI Type Published by	Cooling Measures and Housing Wealth: Evidence from Singapore Wolfgang Karl Härdle; Rainer Schulz; Taojun Sie doi:10.48550/arXiv.2108.11915 Article arXiv	CZ, DE	Y	Y	Y	Health, demographic change and wellbeing	Y
31	doi:10.1016/j.jmva.2021.104881 Title Authors DOI Type Published in Published by ISSN Subjects Links	Financial Risk Meter FRM based on Expectiles Rui Ren; Meng-Jou Lu; Yingxing Li; Wolfgang Karl Härdle doi:10.1016/j.jmva.2021.104881 Journal article Journal of Multivariate Analysis Elsevier BV 0047-259X Statistics, Probability and Uncertainty; Numerical Analysis; Statistics and Probability https://api.elsevier.com/content/article/PII: S0047259X21001597?httpAccept=text/xml; https://api.elsevier.com/content/article/PII: S0047259X21001597?httpAccept=text/plain	CZ, DE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
32	doi:10.2139/ssrn.3699345 Title Author DOI Type Published in Published by	A Machine Learning Based Regulatory Risk Index for Cryptocurrencies Xinwen Ni doi:10.2139/ssrn.3699345 Journal article SSRN Electronic Journal Elsevier BV		Other	Y	Y		Y

	ISSN	1556-5068						
33	doi:10.1080/1351847X.2021.1960403 Title Authors DOI Type Published in Published by ISSNs Subject Link	Are cryptos becoming alternative assets? Daniel Traian Pele; Niels Wesselhöfft; Wolfgang Karl Härdle; Michalis Kolossiatis; Yannis G. Yatracos doi:10.1080/1351847X.2021.1960403 Journal article The European Journal of Finance Informa UK Limited 1351-847X; 1466-4364 Economics, Econometrics and Finance (miscellaneous) https://www.tandfonline.com/doi/pdf/10.1080/1351847X.2021.1960403	CY, CZ, DE, RO	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
34	doi:10.1007/978-3-031-15743-1_11 Title Authors DOI Type Published in Published by ISSNs Link	The Use of M2P in Business Process Improvement and Optimization Meriem Kherbouche; Yossra Zghal; Bálint Molnár; András Benczúr doi:10.1007/978-3-031-15743-1_11 Book chapter New Trends in Database and Information Systems Springer International Publishing 1865-0929; 1865-0937 https://link.springer.com/content/pdf/10.1007/978-3-031-15743-1_11		Other	Y	Y		Y
35	doi:10.1016/j.ijforecast.2021.11.001 Title Authors	Forecasting: theory and practice Fotios Petropoulos; Daniele Apiletti; Vassilios Assimakopoulos; Mohamed Zied Babai; Devon K. Barrow; Souhaib Ben Taieb; Christoph Bergmeir; Ricardo J. Bessa; Jakub Bijak; John E. Boylan; Jethro Browell; Claudio Carnevale; Jennifer L. Castle; Pasquale Cirillo;	AT, BE, CY, DK, FR, DE, EL, IE, IT, NO, PL, PT, ES, CH, UK	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y

Michael P. Clements; Clara Cordeiro; Fernando Luiz Cyrino Oliveira; Shari De Baets; Alexander Dokumentov; Joanne Ellison; Piotr Fiszeder; Philip Hans Franses; David T. Frazier; Michael Gilliland; M. Sinan Gönül; Paul Goodwin; Luigi Grossi; Yael Grushka-Cockayne; Mariangela Guidolin; Massimo Guidolin; Ulrich Gunter; Xiaojia Guo; Renato Guseo; Nigel Harvey; David F. Hendry; Ross Hollyman; Tim Januschowski; Jooyoung Jeon; Victor Richmond R. Jose; Yanfei Kang; Anne B. Koehler; Stephan Kolassa; Nikolaos Kourentzes; Sonia Leva; Feng Li; Konstantia Litsiou; Spyros Makridakis; Gael M. Martin; Andrew B. Martinez; Sheik Meeran; Theodore Modis; Konstantinos Nikolopoulos; Dilek Önkal; Alessia Paccagnini; Anastasios Panagiotelis; Ioannis Panapakidis; Jose M. Pavía; Manuela Pedio; Diego J. Pedregal; Pierre Pinson; Patrícia Ramos; David E. Rapach; J. James Reade; Bahman Rostami-Tabar; Michał Rubaszek; Georgios Sermpinis; Han Lin Shang; Evangelos Spiliotis; Aris A. Syntetos; Priyanga Dilini Talagala; Thiyanga S. Talagala; Len Tashman; Dimitrios Thomakos; Thordis Thorarinsdottir; Ezio Todini; Juan Ramón Trapero Arenas; Xiaoqian Wang; Robert L. Winkler; Alisa Yusupova; Florian Ziel

	S0169207021001758?httpAccept=text/plain							
36	doi:10.3390/forecast3030030 Title Author DOI Type Published in Published by ISSN Subject Link	Editorial for Special Issue "New Frontiers in Forecasting the Business Cycle and Financial Markets" Alessia Paccagnini doi:10.3390/forecast3030030 Journal article Forecasting MDPI AG 2571-9394 General Medicine https://www.mdpi.com/2571-9394/3/3/30/pdf	AT, IE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
37	doi:10.1007/s10551-021-04842-z Title Authors DOI Type Published in Published by ISSNs Subjects Links	Food Prices, Ethics and Forms of Speculation Don Bredin; Valerio Potì; Enrique Salvador doi:10.1007/s10551-021-04842-z Journal article Journal of Business Ethics Springer Science and Business Media LLC 0167-4544; 1573-0697 Law; Economics and Econometrics; Arts and Humanities (miscellaneous); General Business, Management and Accounting; Business and International Management https://link.springer.com/content/pdf/10.1007/s10551-021-04842-z.pdf; https://link.springer.com/article/10.1007/s10551-021-04842-z/fulltext.html	IE, ES	Y	Y	Y	Health, demographic change and wellbeing	Y
38	doi:10.1016/j.econlet.2022.110734 Title	Crypto-environment network connectivity and Bitcoin returns distribution tail	IE, IT, ES	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective	Y

								societies	
	Authors	[Rocco Caferra](#); Andrea Morone; [Valerio Potì](#)							
	DOI	doi:10.1016/j.econlet.2022.110734							
	Type	Journal article							
	Published in	Economics Letters							
	Published by	Elsevier BV							
	ISSN	0165-1765							
	Subjects	Economics and Econometrics; Finance							
	Links	https://api.elsevier.com/content/article/PII:S0165176522002555?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0165176522002555?httpAccept=text/plain							
39	doi:10.1007/s42521-022-00060-y			Other	Y	Y		Y	
	Title	Discussion on: "Programmable money: next generation blockchain based conditional payments" by Ingo Weber and Mark Staples							
	Author	Valerio Poti							
	DOI	doi:10.1007/s42521-022-00060-y							
	Type	Journal article							
	Published in	Digital Finance							
	Published by	Springer Science and Business Media LLC							
	ISSNs	2524-6984; 2524-6186							
	Subject	General Engineering							
	Links	https://link.springer.com/content/pdf/10.1007/s42521-022-00060-y.pdf; https://link.springer.com/article/10.1007/s42521-022-00060-y/fulltext.html							
40	doi:10.2139/ssrn.4173890		IT, UK	Y	Y	Y		Climate action, environment, resource efficiency and raw materials	Y
	Title	Can ESG Shape Cost of Capital? A Bibliometric Review and Empirical Analysis Through ML							
	Authors	Niklas Bussmann; Alessandra Tanda; Ellen Pei-yi Yu							
	DOI	doi:10.2139/ssrn.4173890							

	Type Published in Published by ISSN	Journal article SSRN Electronic Journal Elsevier BV 1556-5068						
41	doi:10.1016/j.frl.2022.103411 Title Authors DOI Type Published in Published by ISSN Subject Links	The role of Environmental, Social, and Governance (ESG) in predicting bank financial distress Alberto Citterio; Timothy King doi:10.1016/j.frl.2022.103411 Journal article Finance Research Letters Elsevier BV 1544-6123 Finance https://api.elsevier.com/content/article/PII:S1544612322005888?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S1544612322005888?httpAccept=text/plain	FI, IT	Y	Y	Y	Climate action, environment, resource efficiency and raw materials	Y
42	doi:10.1007/s42521-022-00055-9 Title Authors DOI Type Published in Published by ISSNs Subject Links	Cryptocurrencies and stablecoins: a high-frequency analysis Emilio Barucci; Giancarlo Giuffra Moncayo; Daniele Marazzina doi:10.1007/s42521-022-00055-9 Journal article Digital Finance Springer Science and Business Media LLC 2524-6984; 2524-6186 General Engineering https://link.springer.com/content/pdf/10.1007/s42521-022-00055-9.pdf; https://link.springer.com/article/10.1007/s42521-022-00055-9/fulltext.html		Other	Y	Y		Y

43	doi:10.1016/j.eswa.2021.116261			Other	Y	Y		Y
	Title	A machine learning model for lapse prediction in life insurance contracts						
	Authors	Michele Azzone; Emilio Barucci; Giancarlo Giuffra Moncayo; Daniele Marazzina						
	DOI	doi:10.1016/j.eswa.2021.116261						
	Type	Journal article						
	Published in	Expert Systems with Applications						
	Published by	Elsevier BV						
	ISSN	0957-4174						
	Subjects	Artificial Intelligence; Computer Science Applications; General Engineering						
	Links	https://api.elsevier.com/content/article/PII:S0957417421015700?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0957417421015700?httpAccept=text/plain						
44	doi:10.1016/j.frl.2022.102941			Other	Y	Y		Y
	Title	Explainable artificial intelligence for crypto asset allocation						
	Authors	Golnoosh Babaei; Paolo Giudici; Emanuela Raffinetti						
	DOI	doi:10.1016/j.frl.2022.102941						
	Type	Journal article						
	Published in	Finance Research Letters						
	Published by	Elsevier BV						
	ISSN	1544-6123						
	Subject	Finance						
	Links	https://api.elsevier.com/content/article/PII:S1544612322002021?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S1544612322002021?httpAccept=text/plain						
45	doi:10.1016/j.eswa.2020.114104			Other	Y	Y		Y
	Title	Shapley-Lorenz eXplainable Artificial Intelligence						
	Authors	Paolo Giudici; Emanuela Raffinetti						

	DOI Type Published in Published by ISSN Subjects Links	[doi:10.1016/j.eswa.2020.114104](#) Journal article Expert Systems with Applications Elsevier BV [0957-4174](#) Artificial Intelligence; Computer Science Applications; General Engineering [https://api.elsevier.com/content/article/PII:S0957417420308575?httpAccept=text/xml](#); [https://api.elsevier.com/content/article/PII:S0957417420308575?httpAccept=text/plain](#)							
46	[doi:10.1007/s42521-022-00062-w](#) Title Author DOI Type Published in Published by ISSNs Subject Links	 Discussion on: "Programmable money: next generation blockchain based conditional payments" by Ingo Weber and Mark Staples Audrius Kabasinskas [doi:10.1007/s42521-022-00062-w](#) Journal article Digital Finance Springer Science and Business Media LLC [2524-6984](#); [2524-6186](#) General Engineering [https://link.springer.com/content/pdf/10.1007/s42521-022-00062-w.pdf](#); [https://link.springer.com/article/10.1007/s42521-022-00062-w/fulltext.html](#)		Other	Y	Y		Y
47	[doi:10.3390/math9172086](#) Title Authors DOI Type Published in Published by	 Clustering of Latvian Pension Funds Using Convolutional Neural Network Extracted Features Vitalija Serapinaitė; [Audrius Kabašinskas](#) [doi:10.3390/math9172086](#) Journal article Mathematics MDPI AG		Other	Y	Y		Y

	ISSN	2227-7390						
	Subjects	General Mathematics; Engineering (miscellaneous); Computer Science (miscellaneous)						
	Link	https://www.mdpi.com/2227-7390/9/17/2086/pdf						
48	doi:10.3389/frai.2022.827584			Other	Y	Y		Y
	Title	Review of Multi-Criteria Decision-Making Methods in Finance Using Explainable Artificial Intelligence						
	Authors	Jurgita Černevičienė; Audrius Kabašinskas						
	DOI	doi:10.3389/frai.2022.827584						
	Type	Journal article						
	Published in	Frontiers in Artificial Intelligence						
	Published by	Frontiers Media SA						
	ISSN	2624-8212						
	Link	https://www.frontiersin.org/articles/10.3389/frai.2022.827584/full						
49	doi:10.1007/s42521-022-00065-7			Other	Y	Y		Y
	Title	Discussion on: "Programmable money: next generation blockchain based conditional payments" by Ingo Weber and Mark Staples						
	Author	Olivija Filipovska						
	DOI	doi:10.1007/s42521-022-00065-7						
	Type	Journal article						
	Published in	Digital Finance						
	Published by	Springer Science and Business Media LLC						
	ISSNs	2524-6984; 2524-6186						
	Subject	General Engineering						
	Links	https://link.springer.com/content/pdf/10.1007/s42521-022-00065-7.pdf; https://link.springer.com/article/10.1007/s42521-022-00065-7/fulltext.html						
50	doi:10.1016/j.apenergy.2022.119182		NO, UK	Y	Y	Y	Europe in a changing	Y

	Title	Empirical study of day-ahead electricity spot-price forecasting: Insights into a novel loss function for training neural networks						world, inclusive innovative and reflective societies
	Authors	Ahmad Amine Loutfi; Mengtao Sun; Ijlal Loutfi; Per Bjarte Solibakke						
	DOI	doi:10.1016/j.apenergy.2022.119182						
	Type	Journal article						
	Published in	Applied Energy						
	Published by	Elsevier BV						
	ISSN	0306-2619						
	Subjects	Management, Monitoring, Policy and Law; Mechanical Engineering; General Energy; Building and Construction						
	Links	https://api.elsevier.com/content/article/PII:S0306261922005542?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0306261922005542?httpAccept=text/plain						
51	doi:10.3390/en15103839			Other	Y	Y		Y
	Title	Projecting and Forecasting the Latent Volatility for the Nasdaq OMX Nordic/Baltic Financial Electricity Market Applying Stochastic Volatility Market Characteristics						
	Author	Per Bjarte Solibakke						
	DOI	doi:10.3390/en15103839						
	Type	Journal article						
	Published in	Energies						
	Published by	MDPI AG						
	ISSN	1996-1073						
	Subjects	Energy (miscellaneous); Energy Engineering and Power Technology; Renewable Energy, Sustainability and the Environment; Electrical and Electronic Engineering; Control and Optimization; Engineering (miscellaneous)						
	Link	https://www.mdpi.com/1996-1073/15/10/3839/pdf						

52	doi:10.1504/IJCEE.2021.10043332 Title Author DOI Type Published in Published by ISSNs Subjects Link	Bootstrapped nonlinear impulse-response analysis: the FTSE100 (UK) and the NDX100 (US) indices 2012-2021 Per Bjarte Solibakke doi:10.1504/IJCEE.2021.10043332 Journal article International Journal of Computational Economics and Econometrics Inderscience Publishers 1757-1170; 1757-1189 Computer Science Applications; Economics and Econometrics http://www.inderscienceonline.com/doi/full/10.1504/IJCEE.2022.120531		Other	Y	Y		Y
53	doi:10.1007/978-3-030-56219-9_9 Title Author DOI Type Published in Published by ISSN Link	Stochastic Volatility Models Predictive Relevance for Equity Markets Per Bjarte Solibakke doi:10.1007/978-3-030-56219-9_9 Book chapter Contributions to Statistics Springer International Publishing 1431-1968 http://link.springer.com/content/pdf/10.1007/978-3-030-56219-9_9		Other	Y	Y		Y
54	doi:10.3389/frai.2021.718450 Title Authors DOI Type Published in Published by ISSN Subject Link	Identification of Scams in Initial Coin Offerings With Machine Learning Bedil Karimov; Piotr Wójcik doi:10.3389/frai.2021.718450 Journal article Frontiers in Artificial Intelligence Frontiers Media SA 2624-8212 General Medicine https://www.frontiersin.org/articles/10.3389/frai.2021.718450/full		Other	Y	Y		Y

55	doi:10.1007/978-3-031-16474-3_40 Title Authors DOI Type Published in Published by ISSNs Link	A Generic Approach to Extend Interpretability of Deep Networks Catarina Silva; António Morais; Bernardete Ribeiro doi:10.1007/978-3-031-16474-3_40 Book chapter Progress in Artificial Intelligence Springer International Publishing 0302-9743; 1611-3349 https://link.springer.com/content/pdf/10.1007/978-3-031-16474-3_40		Other	Y	Y		Y
56	doi:10.1007/978-3-030-93286-2_7 Title Authors DOI Type Published in Published by ISSNs Link	Is Trust a Valid Indicator of Tax Compliance Behaviour? A Study on Taxpayers' Public Perception Using Sentiment Analysis Tools Coita Ioana-Florina; Cioban Ștefana; Mare Codruța doi:10.1007/978-3-030-93286-2_7 Book chapter Digitalization and Big Data for Resilience and Economic Intelligence Springer International Publishing 2198-7246; 2198-7254 https://link.springer.com/content/pdf/10.1007/978-3-030-93286-2_7		Other	Y	Y		Y
57	doi:10.1007/978-981-16-2765-1_6 Title Authors DOI Type Published in Published by ISSNs Link	The Utility of Neural Model in Predicting Tax Avoidance Behavior Coita Ioana-Florina; Codruța Mare doi:10.1007/978-981-16-2765-1_6 Book chapter Intelligent Decision Technologies Springer Singapore 2190-3018; 2190-3026 https://link.springer.com/content/pdf/10.1007/978-981-16-2765-1_6		Other	Y	Y		Y

58	doi:10.3390/risks9060116		Other	Y	Y		Y
	Title	A Statistical Model of Fraud Risk in Financial Statements. Case for Romania Companies					
	Authors	Andrada-Ioana Sabău (Popa); Codruța Mare; Ioana Lavinia Safta					
	DOI	doi:10.3390/risks9060116					
	Type	Journal article					
	Published in	Risks					
	Published by	MDPI AG					
	ISSN	2227-9091					
	Subjects	Strategy and Management; Economics, Econometrics and Finance (miscellaneous); Accounting					
	Link	https://www.mdpi.com/2227-9091/9/6/116/pdf					
59	doi:10.3390/risks9060104		Other	Y	Y		Y
	Title	Privacy Intrusiveness in Financial-Banking Fraud Detection					
	Authors	Larisa Găbudeanu; Iulia Brici; Codruța Mare; Ioan Cosmin Mihai; Mircea Constantin Șcheau					
	DOI	doi:10.3390/risks9060104					
	Type	Journal article					
	Published in	Risks					
	Published by	MDPI AG					
	ISSN	2227-9091					
	Subjects	Strategy and Management; Economics, Econometrics and Finance (miscellaneous); Accounting					
	Link	https://www.mdpi.com/2227-9091/9/6/104/pdf					
60	doi:10.3390/math10193625		Other	Y	Y		Y
	Title	Machine Learning Models for Predicting Romanian Farmers' Purchase of Crop Insurance					
	Authors	Codruţa Mare; Daniela Manaţe; Gabriela-Mihaela Mureşan; Simona Laura Dragoş; Cristian Mihai Dragoş; Alexandra-Anca					

		Purcel						
	DOI	doi:10.3390/math10193625						
	Type	Journal article						
	Published in	Mathematics						
	Published by	MDPI AG						
	ISSN	2227-7390						
	Subjects	General Mathematics; Engineering (miscellaneous); Computer Science (miscellaneous)						
	Link	https://www.mdpi.com/2227-7390/10/19/3625/pdf						
61	doi:10.15308/finiz-2020-97-102			Other	Y	Y		Y
	Title	Echo State Networks Usage for Stock Price Predictions						
	Authors	Lidija Barjaktarović; Marko Barjaktarović; Snežana Konjikušić						
	DOI	doi:10.15308/finiz-2020-97-102						
	Type	Proceedings article						
	Published in	Proceedings of the 7th International Scientific Conference - FINIZ 2020						
	Published by	Singidunum University						
	Link	http://portal.finiz.singidunum.ac.rs/Media/files/2020/97-102.pdf						
62	doi:10.1016/j.ipm.2021.102848		CZ, RS, SK	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Financial literacy and psychological disaster preparedness: applicability of approach based on fuzzy functional dependencies						
	Authors	Miljan Vučetić; Zuzana Brokešová; Miroslav Hudec; Erika Pastoráková						
	DOI	doi:10.1016/j.ipm.2021.102848						
	Type	Journal article						
	Published in	Information Processing & Management						
	Published by	Elsevier BV						
	ISSN	0306-4573						
	Subjects	Library and Information Sciences; Management Science and Operations Research; Computer Science Applications; Media Technology;						

	Links	Information Systems https://api.elsevier.com/content/article/PII:S0306457321003204?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0306457321003204?httpAccept=text/plain							
63	doi:10.1016/j.elerap.2021.101079 Title Authors DOI Type Published in Published by ISSN Subjects Links	Risk-return modelling in the p2p lending market: Trends, gaps, recommendations and future directions Miller-Janny Ariza-Garzón; María-Del-Mar Camacho-Miñano; María-Jesús Segovia-Vargas; Javier Arroyo doi:10.1016/j.elerap.2021.101079 Journal article Electronic Commerce Research and Applications Elsevier BV 1567-4223 Management of Technology and Innovation; Marketing; Computer Networks and Communications; Computer Science Applications https://api.elsevier.com/content/article/PII:S156742232100051X?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S156742232100051X?httpAccept=text/plain		Other	Y	Y		Y
64	doi:10.1186/s40854-021-00310-9 Title Authors DOI Type Published in Published by	Analysis of the cryptocurrency market using different prototype-based clustering techniques Luis Lorenzo; Javier Arroyo doi:10.1186/s40854-021-00310-9 Journal article Financial Innovation Springer Science and Business Media		Other	Y	Y		Y

		LLC					
	ISSN	2199-4730					
	Subjects	Management of Technology and Innovation; Finance					
	Links	https://link.springer.com/content/pdf/10.1186/s40854-021-00310-9.pdf; https://link.springer.com/article/10.1186/s40854-021-00310-9/fulltext.html					
65	doi:10.1007/s42521-022-00063-9			Other	Y	Y		Y
	Title	Discussion on: "Programmable money: next generation blockchain based conditional payments" by Ingo Weber and Mark Staples					
	Author	Joerg Osterrieder					
	DOI	doi:10.1007/s42521-022-00063-9					
	Type	Journal article					
	Published in	Digital Finance					
	Published by	Springer Science and Business Media LLC					
	ISSNs	2524-6984; 2524-6186					
	Subject	General Engineering					
	Links	https://link.springer.com/content/pdf/10.1007/s42521-022-00063-9.pdf; https://link.springer.com/article/10.1007/s42521-022-00063-9/fulltext.html					
66	doi:10.2139/ssrn.3796351		NL, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	THE VIX INDEX UNDER SCRUTINY OF MACHINE LEARNING TECHNIQUES AND NEURAL NETWORKS					
	Authors	Ali Hirsa; Branka Hadji Misheva; Joerg Osterrieder; Wenxin Cao; Yiwen Fu; Hanze Sun; Kin Wai Wong					
	DOI	doi:10.2139/ssrn.3796351					
	Type	Journal article					
	Published in	SSRN Electronic Journal					
	Published by	Elsevier BV					
	ISSN	1556-5068					

67	doi:10.3389/frai.2021.668465		NL, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	The Applicability of Self-Play Algorithms to Trading and Forecasting Financial Markets						
	Authors	Jan-Alexander Posth; Piotr Kotlarz; Branka Hadji Misheva; Joerg Osterrieder; Peter Schwendner						
	DOI	doi:10.3389/frai.2021.668465						
	Type	Journal article						
	Published in	Frontiers in Artificial Intelligence						
	Published by	Frontiers Media SA						
	ISSN	2624-8212						
	Subject	General Medicine						
	Link	https://www.frontiersin.org/articles/10.3389/frai.2021.668465/full						
68	doi:10.2139/ssrn.3865019		NL, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Deep Reinforcement Learning for Finance and the Efficient Market Hypothesis						
	Authors	Leander Odermatt; Jetmir Beqiraj; Joerg Osterrieder						
	DOI	doi:10.2139/ssrn.3865019						
	Type	Journal article						
	Published in	SSRN Electronic Journal						
	Published by	Elsevier BV						
	ISSN	1556-5068						
69	doi:10.2139/ssrn.3867800		NL, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Deep Reinforcement Learning on a Multi-Asset Environment for Trading						
	Authors	Ali Hirsa; Branka Hadji Misheva; Joerg Osterrieder; Jan-Alexander Posth						
	DOI	doi:10.2139/ssrn.3867800						
	Type	Journal article						
	Published in	SSRN Electronic Journal						
	Published by	Elsevier BV						
	ISSN	1556-5068						
70	doi:10.2139/ssrn.3864965			Other	Y	Y		Y
	Title	Generative Adversarial Networks in						

#	Details		Countries	Type				Challenge	
	Author	finance: an overview Florian Eckerli							
	DOI	doi:10.2139/ssrn.3864965							
	Type	Journal article							
	Published in	SSRN Electronic Journal							
	Published by	Elsevier BV							
	ISSN	1556-5068							
71	doi:10.2139/ssrn.3864867			Other	Y	Y			Y
	Title	Generative Adversarial Network For synthetic data on Bitcoin returns							
	Author	Moritz Pfenninger							
	DOI	doi:10.2139/ssrn.3864867							
	Type	Journal article							
	Published in	SSRN Electronic Journal							
	Published by	Elsevier BV							
	ISSN	1556-5068							
72	doi:10.2139/ssrn.3898792		NL, CH		Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Analyzing Deep Generated Financial Time Series for Various Asset Classes							
	Authors	Antonio Rosolia; Joerg Osterrieder							
	DOI	doi:10.2139/ssrn.3898792							
	Type	Journal article							
	Published in	SSRN Electronic Journal							
	Published by	Elsevier BV							
	ISSN	1556-5068							
73	doi:10.3389/frai.2021.794996			Other	Y	Y			Y
	Title	Audience-Dependent Explanations for AI-Based Risk Management Tools: A Survey							
	Authors	Branka Hadji Misheva; David Jaggi; Jan-Alexander Posth; Thomas Gramespacher; Joerg Osterrieder							
	DOI	doi:10.3389/frai.2021.794996							
	Type	Journal article							
	Published in	Frontiers in Artificial Intelligence							
	Published by	Frontiers Media SA							
	ISSN	2624-8212							
	Subject	General Medicine							

#	Details						Topic	
	Link	https://www.frontiersin.org/articles/10.3389/frai.2021.794996/full						
74	doi:10.2139/ssrn.3858730 Title Authors DOI Type Published in Published by ISSN	 Risk Parity for Multi-Asset Futures Allocation – A Practical Analysis of the Equal Risk Contribution Portfolio Chris Bucher; Joerg Osterrieder doi:10.2139/ssrn.3858730 Journal article SSRN Electronic Journal Elsevier BV 1556-5068	NL, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
75	doi:10.2139/ssrn.4087569 Title Authors DOI Type Published in Published by ISSN	 High-Frequency Causality between Stochastic Volatility Time Series: Empirical Evidence Kia Farokhnia; Joerg Osterrieder doi:10.2139/ssrn.4087569 Journal article SSRN Electronic Journal Elsevier BV 1556-5068	NL, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
76	doi:10.3905/jfds.2022.1.109 Title Authors DOI Type Published in Published by ISSN Subject Link	 Tackling the Exponential Scaling of Signature-Based Generative Adversarial Networks for High-Dimensional Financial Time-Series Generation Fernando de Meer Pardo; Peter Schwendner; Marcus Wunsch doi:10.3905/jfds.2022.1.109 Journal article The Journal of Financial Data Science Pageant Media US 2640-3943 General Medicine https://syndication.highwire.org/content/doi/10.3905/jfds.2022.1.109		Other	Y	Y		Y

#	Details							
77	doi:10.3905/jfds.2021.1.078 Title — Adaptive Seriational Risk Parity and Other Extensions for Heuristic Portfolio Construction Using Machine Learning and Graph Theory Authors — Peter Schwendner; Jochen Papenbrock; Markus Jaeger; Stephan Krügel DOI — doi:10.3905/jfds.2021.1.078 Type — Journal article Published in — The Journal of Financial Data Science Published by — Pageant Media US ISSN — 2640-3943 Link — https://syndication.highwire.org/content/doi/10.3905/jfds.2021.1.078	DE, CH	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y
78	doi:10.1111/corg.12454 Title — Bankers' remuneration reforms and new challenges Author — Anna (Ania) Zalewska DOI — doi:10.1111/corg.12454 Type — Journal article Published in — Corporate Governance: An International Review Published by — Wiley ISSNs — 0964-8410; 1467-8683 Subjects — Management of Technology and Innovation; Strategy and Management; General Business, Management and Accounting Links — https://onlinelibrary.wiley.com/doi/pdf/10.1111/corg.12454; https://onlinelibrary.wiley.com/doi/full-xml/10.1111/corg.12454		Other	Y	Y		Y
79	doi:10.2139/ssrn.3890364 Title — The impact of machine learning and big data on credit markets Authors — Peter Eccles; Paul Grout; Paolo Siciliani; Anna Zalewska DOI — doi:10.2139/ssrn.3890364 Type — Journal article		Other	Y	Y		Y

		http://link.springer.com/content/pdf/10.1007/978-3-030-51093-0						
83	doi:10.1007/s11634-022-00508-4 Title Authors DOI Type Published in Published by ISSNs Subjects Links	On mathematical optimization for clustering categories in contingency tables Emilio Carrizosa; Vanesa Guerrero; Dolores Romero Morales doi:10.1007/s11634-022-00508-4 Journal article Advances in Data Analysis and Classification Springer Science and Business Media LLC 1862-5347; 1862-5355 Applied Mathematics; Computer Science Applications; Statistics and Probability https://link.springer.com/content/pdf/10.1007/s11634-022-00508-4.pdf; https://link.springer.com/article/10.1007/s11634-022-00508-4/fulltext.html	DK, ES	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
84	doi:10.1016/j.eswa.2022.117423 Title Authors DOI Type Published in Published by ISSN Subjects Links	The tree based linear regression model for hierarchical categorical variables Emilio Carrizosa; Laust Hvas Mortensen; Dolores Romero Morales; M. Remedios Sillero-Denamiel doi:10.1016/j.eswa.2022.117423 Journal article Expert Systems with Applications Elsevier BV 0957-4174 Artificial Intelligence; Computer Science Applications; General Engineering https://api.elsevier.com/content/article/PII:S095741742200762X?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S095741742200762X?httpAccept=text/plain	DK, IE, ES	Y	N	Y	Europe in a changing world, inclusive innovative and reflective societies	Y

85	doi:10.1016/j.ejor.2021.12.022		DK, ES	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	On sparse optimal regression trees						
	Authors	Rafael Blanquero; Emilio Carrizosa; Cristina Molero-Río; Dolores Romero Morales						
	DOI	doi:10.1016/j.ejor.2021.12.022						
	Type	Journal article						
	Published in	European Journal of Operational Research						
	Published by	Elsevier BV						
	ISSN	0377-2217						
	Subjects	Information Systems and Management; Management Science and Operations Research; Modeling and Simulation; General Computer Science; Industrial and Manufacturing Engineering						
	Links	https://api.elsevier.com/content/article/PII:S0377221721010626?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0377221721010626?httpAccept=text/plain						
86	doi:10.1016/j.omega.2021.102543		DK, ES	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Interpreting clusters via prototype optimization						
	Authors	Emilio Carrizosa; Kseniia Kurishchenko; Alfredo Marín; Dolores Romero Morales						
	DOI	doi:10.1016/j.omega.2021.102543						
	Type	Journal article						
	Published in	Omega						
	Published by	Elsevier BV						
	ISSN	0305-0483						
	Subjects	Information Systems and Management; Management Science and Operations Research; Strategy and Management						
	Links	https://api.elsevier.com/content/article/PII:S0305048321001523?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0305048321001523?httpAccept=text/pla						

		in						
87	doi:10.1016/j.eswa.2021.115245 Title Authors DOI Type Published in Published by ISSN Subjects Links	On clustering categories of categorical predictors in generalized linear models Emilio Carrizosa; Marcela Galvis Restrepo; Dolores Romero Morales doi:10.1016/j.eswa.2021.115245 Journal article Expert Systems with Applications Elsevier BV 0957-4174 Artificial Intelligence; Computer Science Applications; General Engineering https://api.elsevier.com/content/article/PII:S0957417421006771?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0957417421006771?httpAccept=text/plain	DK, ES	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
88	doi:10.1016/j.ejor.2021.04.016 Title Authors DOI Type Published in Published by ISSN Subjects	On sparse ensemble methods: An application to short-term predictions of the evolution of COVID-19 Sandra Benítez-Peña; Emilio Carrizosa; Vanesa Guerrero; M. Dolores Jiménez-Gamero; Belén Martín-Barragán; Cristina Molero-Río; Pepa Ramírez-Cobo; Dolores Romero Morales; M. Remedios Sillero-Denamiel doi:10.1016/j.ejor.2021.04.016 Journal article European Journal of Operational Research Elsevier BV 0377-2217 Information Systems and Management; Management Science and Operations Research; Modeling and Simulation; General Computer Science; Industrial and	DK, ES, UK	Y	N	N	Health, demographic change and wellbeing	Y

	Links	Manufacturing Engineering https://api.elsevier.com/content/article/PII:S0377221721003283?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0377221721003283?httpAccept=text/plain						
89	doi:10.1016/j.cor.2021.105281 Title Authors DOI Type Published in Published by ISSN Subjects Links	Optimal randomized classification trees Rafael Blanquero; Emilio Carrizosa; Cristina Molero-Río; Dolores Romero Morales doi:10.1016/j.cor.2021.105281 Journal article Computers & Operations Research Elsevier BV 0305-0548 Management Science and Operations Research; Modeling and Simulation; General Computer Science https://api.elsevier.com/content/article/PII:S0305054821000733?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0305054821000733?httpAccept=text/plain	DK, ES	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
90	doi:10.1007/s11750-021-00594-1 Title Authors DOI Type Published in Published by ISSNs Subjects	Mathematical optimization in classification and regression trees Emilio Carrizosa; Cristina Molero-Río; Dolores Romero Morales doi:10.1007/s11750-021-00594-1 Journal article TOP Springer Science and Business Media LLC 1134-5764; 1863-8279 Discrete Mathematics and Combinatorics; Statistics and Probability; Management	DK, ES	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y

	Links	Science and Operations Research; Information Systems and Management; Modeling and Simulation http://link.springer.com/content/pdf/10.1007/s11750-021-00594-1.pdf; http://link.springer.com/article/10.1007/s11750-021-00594-1/fulltext.html						
91	doi:10.1016/j.omega.2019.05.004 Title Authors DOI Type Published in Published by ISSN Subjects Links	Feature Selection in Data Envelopment Analysis: A Mathematical Optimization approach Sandra Benítez-Peña; Peter Bogetoft; Dolores Romero Morales doi:10.1016/j.omega.2019.05.004 Journal article Omega Elsevier BV 0305-0483 Information Systems and Management; Management Science and Operations Research; Strategy and Management https://api.elsevier.com/content/article/PII:S0305048318312131?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0305048318312131?httpAccept=text/plain	DK, ES	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
92	doi:10.1016/j.ejor.2019.12.002 Title Authors DOI Type Published in Published by ISSN	Sparsity in optimal randomized classification trees Rafael Blanquero; Emilio Carrizosa; Cristina Molero-Río; Dolores Romero Morales doi:10.1016/j.ejor.2019.12.002 Journal article European Journal of Operational Research Elsevier BV 0377-2217	DK, ES	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y

	Subjects	Information Systems and Management; Management Science and Operations Research; Modeling and Simulation; General Computer Science; Industrial and Manufacturing Engineering						
	Links	https://api.elsevier.com/content/article/PII:S0377221719309865?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0377221719309865?httpAccept=text/plain						
93	doi:10.1016/j.intfin.2021.101321 Title Authors DOI Type Published in Published by ISSN Subjects Links	The effects of a "black swan" event (COVID-19) on herding behavior in cryptocurrency markets Larisa Yarovaya; Roman Matkovskyy; Akanksha Jalan doi:10.1016/j.intfin.2021.101321 Journal article Journal of International Financial Markets, Institutions and Money Elsevier BV 1042-4431 Economics and Econometrics; Finance https://api.elsevier.com/content/article/PII:S1042443121000408?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S1042443121000408?httpAccept=text/plain	FR, UK	Y	N	N	Health, demographic change and wellbeing	Y
94	doi:10.1016/j.irfa.2021.101958 Title Authors DOI Type Published in	"Shiny" crypto assets: A systemic look at gold-backed cryptocurrencies during the COVID-19 pandemic Akanksha Jalan; Roman Matkovskyy; Larisa Yarovaya doi:10.1016/j.irfa.2021.101958 Journal article International Review of Financial Analysis	FR, UK	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y

	Published by ISSN Subjects Links	Elsevier BV 1057-5219 Economics and Econometrics; Finance https://api.elsevier.com/content/article/PII:S1057521921002787?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S1057521921002787?httpAccept=text/plain						
95	doi:10.1080/1351847X.2020.1869992 Title Authors DOI Type Published in Published by ISSNs Subject Link	What effect did the introduction of Bitcoin futures have on the Bitcoin spot market? Akanksha Jalan; Roman Matkovskyy; Andrew Urquhart doi:10.1080/1351847X.2020.1869992 Journal article The European Journal of Finance Informa UK Limited 1351-847X; 1466-4364 Economics, Econometrics and Finance (miscellaneous) https://www.tandfonline.com/doi/pdf/10.1080/1351847X.2020.1869992	FR, UK	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
96	doi:10.1214/20-AOS2019 Title Authors DOI Type Published in Published by ISSN Subjects	LASSO-driven inference in time and space Victor Chernozhukov; Wolfgang Karl Härdle; Chen Huang; Weining Wang doi:10.1214/20-AOS2019 Journal article The Annals of Statistics Institute of Mathematical Statistics 0090-5364 Statistics, Probability and Uncertainty; Statistics and Probability	DK, DE	N	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
97	doi:10.1080/14697688.2021.1880023 Title	Investing with cryptocurrencies –	CZ, DE, UK	Y	N	N	Europe in a changing world, inclusive	Y

		evaluating their potential for portfolio allocation strategies					innovative and reflective societies	
	Authors	Alla Petukhina; Simon Trimborn; Wolfgang Karl Härdle; Hermann Elendner						
	DOI	doi:10.1080/14697688.2021.1880023						
	Type	Journal article						
	Published in	Quantitative Finance						
	Published by	Informa UK Limited						
	ISSNs	1469-7688; 1469-7696						
	Subjects	General Economics, Econometrics and Finance; Finance						
	Link	https://www.tandfonline.com/doi/pdf/10.1080/14697688.2021.1880023						
98	doi:10.1016/j.jedc.2021.104290		CZ, DE, CH, UK	Y	N	N	Europe in a changing world, inclusive innovative and reflective societies	Y
	Title	Media-expressed tone, option characteristics, and stock return predictability						
	Authors	Cathy Yi-Hsuan Chen; Matthias R. Fengler; Wolfgang Karl Härdle; Yanchu Liu						
	DOI	doi:10.1016/j.jedc.2021.104290						
	Type	Journal article						
	Published in	Journal of Economic Dynamics and Control						
	Published by	Elsevier BV						
	ISSN	0165-1889						
	Subjects	Applied Mathematics; Control and Optimization; Economics and Econometrics						
	Links	https://api.elsevier.com/content/article/PII:S0165188921002256?httpAccept=text/xml; https://api.elsevier.com/content/article/PII:S0165188921002256?httpAccept=text/plain						
99	doi:10.1016/j.irfa.2021.101915			Other	Y	Y		Y
	Title	VCRIX — A volatility index for crypto-currencies						
	Authors	Alisa Kim; Simon Trimborn; Wolfgang Karl						

100	doi:10.1016/j.ijforecast.2021.11.001 Title: Forecasting: theory and practice Authors: Fotios Petropoulos, Daniele Apiletti, Vassilios Assimakopoulos, Mohamed Zied Babai, Devon K. Barrow, Souhaib Ben Taieb, Christoph Bergmeir, Ricardo J. Bessa, Jakub Bijak, John E. Boylan, Jethro Browell, Claudio Carnevale, Jennifer L. Castle, Pasquale Cirillo, Michael P. Clements, Clara Cordeiro, Fernando Luiz Cyrino Oliveira, Shari De Baets, Alexander Dokumentov, Joanne Ellison, Piotr Fiszeder, Philip Hans Franses, David T. Frazier, Michael Gilliland, M. Sinan Gönül, Paul Goodwin, Luigi Grossi, Yael Grushka-Cockayne, Mariangela Guidolin, Massimo Guidolin, Ulrich Gunter, Xiaojia Guo, Renato Guseo, Nigel Harvey, David F. Hendry, Ross Hollyman, Tim Januschowski, Jooyoung Jeon, Victor Richmond R. Jose, Yanfei Kang, Anne B. Koehler, Stephan Kolassa, Nikolaos Kourentzes, Sonia Leva, Feng Li, Konstantia Litsiou, Spyros Makridakis, Gael M. Martin, Andrew B. Martinez, Sheik Meeran, Theodore Modis, Konstantinos Nikolopoulos, Dilek Önkal, Alessia Paccagnini, Anastasios Panagiotelis, Ioannis Panapakidis, Jose M. Pavía, Manuela Pedio, Diego J. Pedregal, Pierre Pinson, Patrícia Ramos, David E. Rapach, J. James Reade, Bahman Rostami-Tabar, Michał Rubaszek, Georgios Sermpinis, Han Lin Shang, Evangelos Spiliotis, Aris A. Syntetos, Priyanga Dilini Talagala, Thiyanga S. Talagala, Len Tashman, Dimitrios Thomakos, Thordis Thorarinsdottir, Ezio Todini, Juan Ramón Trapero Arenas, Xiaoqian Wang, Robert L. Winkler, Alisa Yusupova, Florian Ziel Title of the periodical: International Journal of Forecasting Volume 38, Issue 3	AT, IE	Y	Y	Y	Europe in a changing world, inclusive innovative and reflective societies	Y

	Year of publication: 2022						
	Pages 705-871						

Projects resulting from Action activities

Please enter below all the projects on the topic of the Action resulting from Action activities, involving at least one Action participant, and for which the Action networking was necessary.

The Action reported 10 project(s) and 10 proposal(s) resulting from the Action networking.

Key details of the projects are shown below.

#	Title	Countries participating in the Action among proposers	Main proposer name	Funder	Amount	Call identifier	Relevance to H2020 Societal Challenge
1	Crypto Currencies and Nordic Youth	FR	Roman Matkovskyy	Trans-national	25000 €	OEE Grand call 2022	Europe in a changing world, inclusive innovative and reflective societies
2	Network-based credit risk models on P2p lending markets	CZ, CH	Eduard Baumöhl	Trans-national	500000 €	Czech Science Foundation and SNSF Lead Agency	Europe in a changing world, inclusive innovative and reflective societies
3	Blockchain and Fraud Detection	CH, UA	Joerg Osterrieder	Trans-national	6300 €	SNF	Secure societies, protecting freedom and security of Europe and its citizens
4	Network-based credit risk models on P2P lending markets	CZ, CH	Branka Hadji Misheva	Trans-national	500000 €	SNSF Lead Agency	Europe in a changing world,

							inclusive innovative and reflective societies
5	Digital Finance and Reinforcement Learning	CH	Joerg Osterrieder	National	400000 €	Innosuisse	Europe in a changing world, inclusive innovative and reflective societies
6	Narrative Digital Finance: a tale of structural breaks, bubbles & market narratives	CZ, EE, IE, MK, ES, CH	Joerg Osterrieder	National	240658 €	SNF	Europe in a changing world, inclusive innovative and reflective societies
7	Blockchain	CH	Joerg Osterrieder	National	200000 €	Innosuisse	Europe in a changing world, inclusive innovative and reflective societies
8	DataInc - Intelligent Data Integration and Cleaning	CH	Branka Hadji Misheva	National	500000 €	Innosuisse	Europe in a changing world, inclusive innovative and reflective societies
9	IRTG 1792 extension 2022.10-2023.3	DE	WK Härdle	National	200000 €	DFG	Europe in a changing world, inclusive innovative and reflective societies
10	XAI in credit risk management	CH	Branka Hadji Misheva	National	350000 €	Innosuisse	Europe in a changing world, inclusive innovative and reflective societies

Other outputs / achievements

Please enter below any additional outputs/ achievements on the topic of the Action that contribute to the COST mission: "COST enables break-through scientific developments leading to new concepts and products and thereby contributes to strengthen Europe's research and innovation capacities", and for which the Action networking was necessary (e.g. a patent, standards, white paper).

Output / achievement description	Dependence of achievement on the Action networking
The Croatian team gave a contribution to the organisation of a COST FinAI event – International Scientific Conference Technology, Innovation and Stability: New Directions in Finance (TINFIN), May 5-6, 2022: The Conference, held in Zagreb and online, was organised by the Faculty of Economics and Business of the University of Zagreb, Croatian Academy of Sciences and Arts and COST Action - Fintech and Artificial Intelligence in Finance - Towards a Transparent Financial Industry. The Programme Committee and the Organising Committee of the Conference was formed dominantly by COST FinAI Action's participants, where special attention was payed to diversity regarding their gender and experience as well as inclusion of ITC. The event was devoted to topics of current challenges for the financial industry, focusing on fintech and artificial intelligence in finance, and the participants interested in more traditional framework of finance and economics also found their place. The event hosted several different activities, including: keynote session titled "Manifold destiny: Unsupervised machine learning for the social sciences" by professor James Ming Chen, Michigan State University, College of Law, USA; COST session with invited talk on "Overview of COST Action CA19130 FinAI - Fintech and Artificial Intelligence in Finance - Towards a Transparent Financial Industry" by the Action Chair – professor Jörg Osterrieder, Zurich University of Applied Sciences - ZHAW, School of Engineering, Switzerland / Bern Business School, Institute of Applied Data Science and Finance, Switzerland; meeting of the COST FinAI WG 2 with research presentations of WG 2 members; additional parallel tracks of research presentations of other authors; and panel discussion titled „FinTech in 2022 and beyond: Possibilities and new regulatory challenges", gathering various stakeholders in the FinTech field, including industry professionals and regulators. The Conference hosted around 60 participants, coming from over 15 countries. Conference proceedings are planned to be published.	High
Organised WG1 meeting at Rennes School of Business jointly with the Crypto-currency investment conference (April 2022) contributed to mutual knowledge exchange and knowledge dissemination as well as to a network extension and launching new projects.	High
Maria Moloney has been accepted onto the CEDPO AI WG, (Working Group for Artificial Intelligence of the Confederation of European Data Protection Organisations) based in Brussels. We will be working on advising policy regarding AI from the perspective of data protection.	High
We have expanded substantially our academic base on quantlet.com, founded by WG1 leader, Prof Härdle, HU Berlin. This is the foundation of hundreds of academic papers.	High

We have founded quantinar.com, WG1 leader, Prof Härdle, HU Berlin. This is the foundation of a substantial number of data sources, academic training and teaching materials and research dissemination.	High
We build up a research and development (R&D) relationship with the OTP, the largest Hungarian retail bank, in the area of financial services technologies that could involve a number of different research initiatives and activities. Some potential areas of focus could include: - Blockchain application in financial business processes: This could involve researching and developing ways in which blockchain technology can be used to streamline and improve various financial processes, such as payments, clearing, and settlement. - NFT (non-fungible token): This could involve researching and developing ways in which NFTs can be used to represent and trade digital assets, such as art, collectibles, and virtual real estate. Digital money, currencies, assets: This could involve researching and developing ways to use digital currencies and assets in financial transactions, including the use of central bank digital currencies (CBDCs) and stablecoins. - Participating as members in the Hungarian Blockchain coalition: This involves joining a group of industry participants working together to advance the use of blockchain technology in Hungary, through the logistics workgroup, legal group and financial institutions group.	Medium
Condruta Mare, Alessandra Tanda, and Vasil Strat conceptualized a strategy for engaging stakeholders in the COST Action AI in Finance research network under consideration of the input from various COST members. The authors created a strategy based on the following building blocks: Identifying key stakeholders: Under the premise of engaging with stakeholders, it is important to identify who they are and what their interests and concerns are. This involved identifying relevant industry associations, financial regulators, academics, and other organizations involved in AI and finance with a European country focus. Building relationships: Once key stakeholders have been identified, the strategy considers subsequent steps to build relationships. This involved reaching out to stakeholders directly and inviting them to participate in the network's activities and events, such as workshops, conferences, and webinars. Communication and Transparency: Considerable emphasis was placed on open communication by providing regular updates on the network's activities and progress, as well as sharing research findings and publications. A central objective is to encourage stakeholders to ask questions and provide feedback. Creating opportunities for collaboration: Creating opportunities for stakeholders to collaborate on research projects, pilot studies, and other activities was considered a crucial strategic pillar. This could include providing funding or other resources to support joint projects, or creating a platform where stakeholders can share data and collaborate on research.	High
Luisa Anderloni and Alessandra Tanda cooperated with other COST Action members from different EU countries to retrieve credit information on P2P lending platforms. In a first attempt, a process was developed to collect information on the portfolio of a platform. The following steps were executed: Gather publicly available information: Initial data on a P2P lending platform was gathered by focusing on any publicly available information. This included information on the platform's website, such as loan origination statistics, default rates, and performance metrics. Other sources of publicly available information included regulatory filings, press releases, and financial reports. Analyze loan data: In the following step, the collected publicly available information was analyzed to obtain preliminary insights into the loan data provided by the platform. The information accounted for loan amounts, interest rates, loan terms, borrower credit scores, and other	High

metrics. Thereafter, it was further analyzed how the portfolio composition and diversification; the loan distribution across different loan types, terms, credit scores, and geographies differed across the sample. Compare with industry data: The insights from the analysis were then compared with information from industry data; this information included average interest rates, default rates, loan terms, and other metrics for P2P lending platforms. Perform due diligence: Once the information has been collected and analyzed, it is possible to perform due diligence on the platform. This will involve assessing the platform's risk management practices, its financial position, and its regulatory compliance.	
Marcin Chlebus delivered a research seminar with the topic "XAI Tools in Model Selection for Business Decision Modeling" and discussed the use of explainable artificial intelligence (XAI) tools in the context of business decision modeling. XAI is a field of AI research that aims to develop algorithms and methods that can provide explanations for the decisions made by AI systems. In the context of business decision modeling, XAI tools are used to improve the transparency and interpretability of financial models, and to facilitate the model selection process. The seminar covered several key topics, including: - The limitations of traditional AI models, which may be opaque and difficult to interpret, - The benefits of using XAI tools in business decision modeling, such as improved transparency and accountability, - The impact of XAI on the model selection process is that it provides better understanding of the model's performance, its predictions, and its ability to generalize. - Practical examples of how XAI tools are being used in industry for business decision modeling, such as fraud detection, credit risk assessment, and algorithmic trading. Furthermore, the seminar discovered significant practical examples of how XAI tools may not only improve transparency for financial models, but also impact the model selection process itself. These examples included, but were not limited to: - Fraud detection, in which XAI can provide explanations for why a transaction was flagged as potentially fraudulent, allowing analysts to make more informed decisions about whether to pursue further investigation. - Credit risk assessment, where XAI can provide insights into the factors that are most important in determining a borrower's creditworthiness. - Algorithmic trading, in which XAI can explain why a particular trade was executed, allowing traders to make more informed decisions about which trades to execute in the future and improve risk management processes.	High
We constructed an ICO database as part of the published work from the COST Action members Karimov Bedil and Wójcik Piotr (2021), (https://doi.org/10.3389/frai.2021.718450). The ICO database was constructed as a comprehensive and user-friendly tool for researchers in order to enhance future research efforts in the area. The database includes public information on the respective ICO, such as the name, the date it was conducted, the amount of money raised, the tokens being sold, and the team behind the ICO. To construct the database, the following steps were taken: Data gathering: Data was collected on all the ICOs that have been conducted or are currently in the process of being conducted. The information included the name of the ICO, the date it was conducted, the amount of money raised, the tokens being sold, and the team behind the ICO. Data organization: The data was organized into a logical format that is easy to navigate. This included creating categories for different types of information, such as date, amount raised, and team. Database creation: The database management system, was based on MySQL to adequately store the collected data. This will allow for easy searching and filtering of the data.	High

Database population: The collected data was inserted by several COST members into the database and checked for accuracy and consistency. User interface creation: The user interface was designed to include a search function and the ability to filter the data by different categories in order to make it appealing for users to quickly navigate within the tool. Update procedures: Regular updates of the database with new ICOs are conducted to ensure that the data remains accurate and up-to-date.	
Alessandra Tanda currently leads an interactive database project with several COST Action researchers from Portugal to collect and organize information on the past fees and price performance of the most traded ETFs in Europe. The project is currently in the development phase, with a focus on using text mining techniques to extract information from Key Investor Information Documents (KIIDs) of European ETFs. This information includes details about the ETF's performance, fees, and risks, which will be used to create a comprehensive database of European ETFs. Once completed, the database will be made available to COST Action members. This will provide researchers with an easy-to-use resource for researching and investing in European ETFs. The database will be regularly updated with new ETFs as they become available, and it will be accessible online for easy searching and filtering of the data. Overall, the goal is to create a valuable resource for researchers and investors interested in the European ETF market, providing them with a wealth of information on the past performance and fees of the most traded ETFs in Europe.	High
Jeric Vlah led two research seminars at two independent COST Action FinAI events named the 29th Symposium of the Society for Nonlinear Dynamics & Econometrics and conference event "Technology, Innovation and Stability: New Directions in Finance (TINFIN)", Zagreb, Croatia with a focus on investigating time interval choices in technical indicator-based stock price forecasting. His research work discussed the effect of time interval choices on the accuracy of technical indicator-based stock price forecasting. The seminar presentation covered the following key points: - Introduction to technical indicators and their importance in stock price forecasting - The problem of time interval choices and its impact on the accuracy of technical indicator-based predictions - Description of the dataset and methods used in the study - Results of the study and its comparison with other time intervals - Implications and recommendations for practitioners - Conclusion and future work The author outlined the use of a large dataset of historical stock prices and technical indicators that were calculated at different time intervals. Various machine learning algorithms were then used to predict the direction of stock price changes using the technical indicators as input parameters. The performance of the predictions was subsequently evaluated using metrics such as accuracy, precision, and recall indicators. The results of the study indicate that the choice of time interval can have a significant impact on the accuracy of the predictions and that the optimal time interval depends on the specific stock and the technical indicator used. The study concludes that the choice of time interval is an important aspect to consider in technical indicator-based stock price forecasting.	High
A. Ivanisevic Hernaus, J. Kristo, and R. Rako gave a research seminar on the topic "ESG-Related Challenges in the Insurance Industry: A Multi-stakeholder Perspective" at the COST Action FinAI event "Technology, Innovation, and Stability: New Directions in Finance (TINFIN)" in Zagreb, Croatia. The seminar presentation scientifically outlined the challenges faced by the insurance industry in integrating environmental, social, and governance (ESG) factors into their operations and investment decisions. With increasing public and regulatory awareness, insurance companies are facing pressure to align their strategies and activities with sustainable development goals. The authors adopt a multi-	High

stakeholder approach to examine the challenges faced by insurers, policyholders, and regulators in integrating ESG considerations. It was also analyzed what the current state of ESG integration in the insurance industry is, the drivers and barriers to this integration, and the potential solutions for addressing these challenges.

The research presentation covered the following key points:

- Overview of ESG and its importance in the insurance industry
- Examination of the current state of ESG integration in the insurance industry
- Analysis of the challenges faced by insurers, policyholders, and regulators in integrating ESG
- Identification of drivers and barriers for ESG integration in the insurance industry
- Discussion of potential solutions for addressing the challenges and recommendations for the industry

	High
P. Dzelalija and A. Ivanisevic Hernaus presented a research paper with the title "From perceived mobility to the intention to use mobile payments: A moderated mediation analysis" at the COST Action FinAI supported event FinanceCom 2022: International Workshop Enterprise Applications, Markets, and Services in the Finance Industry, University of Twente, the Netherlands. The presentation described factors that influence consumers' intention to use mobile payments. The study adopted a multi-disciplinary approach by combining theories from information systems, marketing, and psychology to explore how perceived mobility and trust, influence the intention to use mobile payments. A moderated mediation analysis was discussed, to examine the direct and indirect effects of perceived mobility and trust on the intention to use mobile payments. In addition, the research examined the moderating effect of demographic factors such as age and gender on the relationship between perceived mobility, trust, and the intention to use mobile payments. Thereby, the study aimed to facilitate the understanding of the complex relationships among the factors being studied, and also provide further insight into the aspects that influence the intention to use mobile payments. The presentation covered the following key points: - Introduction and background on mobile payments and its increasing importance - Theoretical framework: an overview of perceived mobility, trust, and their relationship with the intention to use mobile payments - Research design and methods, including data collection, analysis techniques, and sample characteristics - Results and findings: examination of the direct and indirect effects of perceived mobility, trust, and demographic factors on the intention to use mobile payments - Implications and recommendations for practitioners, policymakers, and researchers. - Conclusion and future work.	High
Branka Hadji Misheva designed, as part of the research work for the COST Action FinAI, an explainable webpage (explainableaiforfinance.com) on visual analytics (VA) tools tailored to financial applications. This webpage provides information and proposes VA tools that include several key features to make them useful for both model developers and evaluators. For model developers, the VA tools include interactive visualizations that allow them to explore and analyze the data used to train their models. Visualizations such as scatter plots, heat maps, and decision trees are recommended to help interested programmers understand the relationships and patterns in the data. Additionally, the tools also include interactive controls that allow the developers to explore different aspects of the data, such as filtering by certain variables or changing the granularity of the analysis. On the other hand, for model evaluators, the VA tools also offer visualizations that provide transparency into the inner workings of the models, such as feature importance plots and partial dependence plots. These types of visualizations support evaluators in understanding how the	High

model is making its predictions and identifying any potential issues or biases in the model. Furthermore, the description of VA tools was also expanded to include a section for evaluating the performance of the models, such as accuracy and AUC-ROC plots, which assist evaluators to better understand how well the model is performing and identify any areas where improvements could be made. In this context, the webpage also provides detailed information about the feature importances, like variable importance and variable interactions, that help understand what the most important features are in a dataset.	
Jörg Osterrieder provided a presentation as part of a panel on the digital transformation of the EU's financial markets at the 11th European Financial Regulation Conference in Brussels in October 2022. The presentation was data-driven and provided facts and figures to back up the statements, including the benefits and drawbacks of the digital transformation and the expected impact on consumers and the market as a whole. It also addressed the role of the EU and its regulators in shaping the digital financial landscape and ways to ensure the protection of consumers while promoting innovation. In total, the talk covered a wide range of topics related to the use of technology in the European financial sector. The general outline for the presentation covered the following points: - Introduction and overview: The panel addressed the current state of the digital transformation within the EU's financial markets and the importance of the topic to the conference. - Overview of the EU's digital landscape: Focus on a high-level overview of the EU's current digital landscape in the financial sector, including the current state of technology adoption and the regulatory environment. - Case studies of digital transformation in action: Specific examples were presented of how different financial institutions in the EU have implemented digital transformation. It was highlighted which cases provided insights into the digital transformation's successes, challenges, and lessons learned. - The role of technology in financial regulation: A specific focus was placed on the investigation of how technology is impacting financial regulation and the implications for regulatory bodies. The presenters discussed some of the emerging technologies and the ways in which they are transforming the financial sector. - Panel discussion: Subsequently, the floor was opened for a panel discussion, where attendees had the opportunity to ask questions and engage in a dialogue with the presentors about the topics covered in the presentation. - Conclusion: The key takeaways from the presentations were summarized, and the sessions were closed by highlighting some of the key challenges and opportunities that lie ahead for the EU's effort to digitally transform its financial markets.	High
Several scholars from the COST Action FinAI, among them Wolfgang Härdle, Vasile Strat, and Alla Petukhina, founded the Blockchain Research Center (BRC) (blockchain-research-center.com) together with other international researchers from leading European universities. The BRC is an organization that aims to promote the study and use of blockchain technology in a variety of applications, including financial services. The BRC aims to support the growth of the blockchain industry by providing a range of tools to researchers, companies, and financial institutions. Some of the key services the BRC provides include: - Customized independent solutions: The BRC provides bespoke solutions that are tailored to the specific needs of its clients.	High

- Scientific support: The BRC offers scientific support to its clients to help them understand and apply blockchain technology in their research or business operations.

- High-level academic lectures: The organization of lectures and other educational events by the BRC help to promote the understanding of blockchain technology among researchers and industry professionals.

- Globally intertwined blockchain forums: The BRC hosts forums and other networking events to promote academic exchange and commercial cooperation among blockchain researchers and industry practitioners.

In order to provide these services, the BRC relies on a team of experts with a wide range of skills and experience in academia, finance, law, investment, and blockchain. This diverse background enables the institute to provide clients with a comprehensive range of services that will help drive academic and industrial development in the blockchain field.

Impacts

Please describe the impacts (the short- to long-term scientific, technological, and / or socioeconomic changes produced by a COST Action, directly or indirectly, intended or unintended) that have resulted, or might result, from the Action in the following table (one impact per line).

Description of the impact, i.e. what will change, and for whom, as a result of what the Action achieved	Type of impact	Timing of impact
Barbara Będowska-Sójka's participation in the COST Action has been instrumental in securing funding from the Polish National Science Center (NCN) for her research project entitled "Properties of a cross-section of rates of return in the cryptocurrency markets" (NCN, nr 2021/41/B/HS4/02443). The funding competition placed a significant emphasis on participation in international projects, with 20% of the total points allocated towards this criterion. As such, the involvement in the COST Action played an important role in this success. The project is planned to last for a duration of 3 years, starting in January 2022, and has been allocated a budget of 483 212 PLN (approximately 100 euros). The focus of the project is to study the properties of the cross-section of rates of return in the cryptocurrency markets, which is an area of research that has seen increasing interest in recent years due to the growing popularity and importance of cryptocurrencies. By utilizing the opportunities and resources provided by the COST Action, the research project aims to make significant contributions to this field of study.	• Scientific / Technological • Economic • Societal	Achieved
Roman Matkovskyy's participation in the COST Action FinAI has been instrumental in shaping the trajectory of the Financial Market and Corporate Outcomes research center that he established and currently leads at Rennes School of Business. Through his involvement in the FinAI program, he was able to gain a deeper understanding of the financial industry and formulate a more comprehensive strategy for the center's research endeavors. Furthermore, his participation in the COST academy training "Understanding EU decision making process - how to advocate your interests", has been beneficial for the development of a research project. The knowledge and skills acquired during the training have enabled him to create more finely-tuned research proposals, which have been submitted to various funding organizations with a higher likelihood of success. In other words, The combination of Roman Matkovskyy's participation in Cost actions FinAI and COST academy training has been a catalyst for the center's research output and funding opportunities.	• Scientific / Technological • Economic • Societal	Achieved
Professor Tom Pilhal is currently undergoing the habilitation process in order to be promoted to the rank of Associate Professor. The committee and referees responsible for evaluating his qualifications have been primarily selected from within the COST Action. This indicates that his academic achievements have a strong connection to the research being conducted within the COST Action. Furthermore, he has also received financial support in the form of a Short-term Scientific Mission (STSM) grant. These factors demonstrate a clear alignment between Professor Pilhal's work and the objectives of the COST Action.	• Scientific / Technological • Economic • Societal	Achieved
Several researchers received active promotions since the start of the Action, and the COST Action FinAI research network had a significant impact on their scientific output as well as their academic achievements: Simon Trimborn was promoted to assistant professor at the	• Scientific / Technological • Economic • Societal	Achieved

Amsterdam School of Economics, University of Amsterdam, in 2022

Wolfgang Karl Härdle was promoted to visiting scholar and YuShan scholar at the department of information management and finance at the National Yang Ming Chiao Tung University (NYCU) in 2022.

Jörg Osterrieder was promoted to an associate professorship in the area of finance and artificial intelligence at the University of Twente in Enschede, the Netherlands.

In addition, Jörg Osterrieder could initiate a new cooperation between the University of Twente and the ING Group, Global Analytics team on advanced quantitative, data-driven research projects, both relevant to academia and industry.

Furthermore, Jörg Osterrieder was also appointed Professor of Sustainable Business at the Bern University of Applied Science in Bern, Switzerland.

Branka Hadji Misheva was promoted to associate professor of applied data science and finance at the Bern University of Applied Science in Bern, Switzerland.

Alla Petukhina was promoted to lecturer and researcher at the Hochschule für Technik und Wirtschaft Berlin (HTW) in 2021.

Our research and knowledge dissemination platform, https://www.meetup.com/Fintech_AI_in_Finance/, has reached a substantial number of academics, professionals and the general public. With more than 150 events, more than 6000 participants and 2000 members, we have build a very large community around the topics of the COST Action CA19130.	• Scientific / Technological • Economic • Societal	Achieved
Several members of the COST Action FinAI contributed to the EIT Digital's Master School on Digital Finance (FinTech) (https://masterschool.eitdigital.eu/fintech), where a two-year program focusing on the intersection of finance and technology was designed.The program covers topics such as digital finance, financial innovation, and FinTech entrepreneurship. The program was created to give students a deep understanding of the digital financial landscape, while also providing them with the skills they need to become successful entrepreneurs in the FinTech space. Reachout activities for the EIT Digital Master School on Digital Finance (FinTech) included the following: - Industry events and networking opportunities where students can connect with FinTech professionals and learn about the latest trends and developments in the field.- Guest lectures from leading FinTech experts and entrepreneurs share their insights and experiences with students.- Field trips to FinTech startups and financial institutions, where students can learn about the day-to-day operations of these organizations and gain insights into the FinTech ecosystem. Furthermore, the COST Action also contributed to the EIT Digital Master School on Data Science (https://masterschool.eitdigital.eu/data-science) and supported the establishment of a two-year program that focuses on the intersection of data science and technology. The program covers topics such as data science, machine learning, and data-driven entrepreneurship. It was aimed at giving students a deep understanding of the digital data landscape, while also providing them with the skills they need to become successful entrepreneurs in the data science space.	• Scientific / Technological • Economic • Societal	Achieved

Reachout activities for the EIT Digital Master School on Data Science included the following: - Industry events and networking opportunities where students can connect with data science professionals and learn about the latest trends and developments in the field.- Guest lectures from leading data science experts and entrepreneurs share their insights and experiences with students.- Field trips to data science startups and companies, where students can learn about the day-to-day operations of these organizations and gain insights into the data science ecosystem.		
The COST Action FinAI was also involved, with the support of several members, in the establishment of the EIT Digital Summer School on Artificial Intelligence in Financial Services (https://summerschool.eitdigital.eu/artificial-intelligence-in-financial-services). The program focuses on the intersection of artificial intelligence and financial services and covers topics such as machine learning, deep learning, natural language processing, and its applications in finance. Students were aimed at being provided with a deep understanding of the digital financial landscape and how artificial intelligence is changing it, while also achieving the necessary skills to become successful entrepreneurs in the field. The program is organized in a way that combines lectures, workshops, and hands-on experience with real-world projects, allowing students to apply the concepts they have learned in a practical context. The program also includes guest lectures from leading experts in the field, as well as visits to financial institutions and startups to learn about the latest trends and developments in the field. The COST Action FinAI also contributed to the EIT Digital Summer School on Disrupting Finance by Digital Technologies (https://summerschool.eitdigital.eu/disrupting-finance-with-digital-technologies). The specifically developed program focuses on the intersection of finance and digital technologies and covers topics such as blockchain, digital currencies, digital identity, and its applications in finance. The program is organized interactively through lectures, workshops, and hands-on experience with real-world projects, allowing students to apply the concepts they have learned in a practical setting as well. Guest lectures as well as on-site visits to financial institutions and start-ups were also incorporated to provide students with the latest trends and developments in the field. Overall, the EIT Digital Summer School programs provide students with an intensive and immersive experience in a specific area of digital technology. Both summer schools also provide opportunities for students to work on projects, participate in competitions and hackathons, and engage with a wide range of stakeholders, including top European corporations, SMEs, startups, universities, and research institutes.	• Scientific / Technological • Economic • Societal	Achieved
The COST Action FinAI helped in the establishment of an internal research network, specifically focused on crypto-market studies. The new network aims to bring together technological, quantitative, and economic researchers from across Europe to tackle future research that requires an interdisciplinary setting. The network is actively involved in the blockchain and FinTech communities, and focuses on enhancing capacity building, the transfer of knowledge, and the inclusion of early-career investigators. The network achieves its goals by organizing conferences and seminars where researchers can share their findings and collaborate on new research. By bringing researchers from different disciplines and backgrounds together, the network aims to enhance the transfer	• Scientific / Technological • Economic • Societal	Achieved

of knowledge in terms of crypto-market expertise and scientific tools across different disciplines and between academia and industry. Furthermore, the network members aimed to establish an inclusive community of crypto researchers on methodological and technological themes. This includes involving early-career investigators and increasing their visibility in the field. Additionally, through the support of the COST Action FinAI, the network further enforces gender equality by actively aiming to involve female researchers in fintech and crypto studies. One example is the female scholar "Akanksha Jalan," who is actively contributing in the field.		
The COST Action CA19130 joins program committees, executive committees, and management committees for a series of events. These events include: Member of the Scientific Committee of ISMP 2024, Montreal (Canada), July 21-26, 2024. Member of the Program Committee of FinanceCom2022, University of Twente (The Netherlands), August 23-24, 2022. Chair of the Program Committee of EURO 2022, Espoo (Finland), July 3-6, 2022. Member of the Program Committee of EURO 2021, Athens (Greece), July 11-14, 2021. Selected keynote events are or will be attended: Keynote Speaker at IFORS2023, Santiago de Chile (Chile), July 10-14, 2023. Keynote Speaker at ISF2023, Charlottesville (Virginia), June 25-28, 2023. Plenary Speaker at the 19th Workshop on Advances in Continuous Optimization, EUROPT 2022, SST NOVA (Portugal), July 29-30, 2022. Plenary Speaker at International Conference on Optimization and Decision Science 2021 (ODS2021), 50th Annual Meeting of AIRO, Rome (Italy), September 14-17, 2021. Keynote Speaker at IEEE CASE 2021 on Data-Driven Automation, Lyon (France), August 23-27, 2021. Holding these events and providing keynote addresses increases the association's influence in many nations and the European Union. It allows academics, industry practitioners, and politicians to further trace the association's contribution to financial research. Moreover, more financial-related groups are willing to participate in association activities.	• Scientific / Technological • Economic • Societal	Achieved
The COST Action FinAI country team from Croatia around Ana Ivanisevic Hernaus actively contributed to the organization of the EURO PhD School "Data Driven Decision Making and Optimization" (https://congreso.us.es/epsdata/), a doctoral training school organized by the IMUS-Mathematical Institute of the University of Seville, Spain. The school was scheduled to take place from June 13–22, 2022, and	• Scientific / Technological • Economic • Societal	Achieved

was delivered to 26 students. 21 invited speakers from academia and industry joined the event. The school was organized to provide students with in-depth knowledge and understanding of the latest research and developments in the fields of data-driven decision making and optimization. The program covered a wide range of topics, including mathematical modeling, machine learning, optimization techniques, and their applications in various fields, such as finance, healthcare, and engineering. A combination of lectures, workshops, and hands-on exercises were delivered by the invited speakers from academia and industry. The speakers shared their expertise and experiences with the students, providing them with a broad perspective on the research field. Additionally, the school also provided opportunities for students to interact with and learn from each other through group work and discussions. Opportunities were also provided for students to present their own research and receive feedback from the invited speakers and other attendees. In this sense, the school was designed to provide students with a comprehensive and in-depth understanding of the latest research and represented a valuable opportunity for PhD students and early-career researchers to learn from experts in the field, network with peers, and further develop their research skills.		
The organization of the workshop "Making Sense of Interpretable Machine Learning" was a collaborative effort between the COST Action FinAI and the Lorentz Center in Leiden, the Netherlands. The workshop was held on October 17–21, 2022, and was localized at the Lorentz Center. The event was also a part of the stream on machine learning and mathematical optimization at EURO2022, which was held in Espoo, Finland, on July 3–6, 2022 (https://euro2022espoo.com/). The workshop was designed to provide a platform for experts in the field of interpretable machine learning to share their latest research findings and developments. To achieve this goal, the workshop consisted of 24 sessions, comprising a total of 95 presentations delivered by leading researchers in the field. These sessions were carefully curated to encompass a diverse range of topics related to interpretable machine learning, thus catering to the interests of a wide audience. As a result, the participants got valuable insights into cutting-edge research in the field of interpretable machine learning and had the opportunity to network with experts in the field. Additionally, the variety of topics covered allowed participants to broaden their understanding of interpretable machine learning and its applications. The selection of speakers for the workshop was done based on the evaluation of their expertise, research contributions, and relevance to the workshop's theme. The organizing team took care of promoting the workshop through various channels, such as the COST FinAI meet-up group, email, and the workshop's official website. The overall goal of the workshop was to create an intellectually stimulating environment where attendees could learn, share, and network with their peers.	• Scientific / Technological • Economic • Societal	Achieved
Dolores Romeo Morales, as member of the COST Action FinAI, is a member of the conference organization committee of the European Conference on Operational Research (EURO) 2024) (https://euro2024cph.dk), which will take place in Copenhagen, Denmark, from June 30 to July 4, 2024. The event is a well-established conference that covers a wide range	• Scientific / Technological • Economic • Societal	Achieved

of topics within the field of operational research, including: mathematical modeling, optimization, decision support systems, simulation, logistics and transportation, production management, finance and economics, and many others. The conference will likely feature keynote speeches, panel discussions, and paper presentations given by leading experts in the field. The topics presented in the conference will likely include recent advances and challenges in the field of operational research, as well as the potential applications and implications of these developments in various industries and domains.

As a member of the conference organization committee for EURO 2024, Dolores Romeo Morales supported the conference committee in the following aspects:

Helping to plan and organize the conference, including determining the theme and format of the conference, selecting keynote speakers, and planning the scientific program.Recruiting attendees and presenters, by reaching out to researchers and academics in the field of operational research and encouraging them to submit papers, make proposals, or attend the conference.Assisting in the selection of paper submissions and presentations, and ensuring that the conference's scientific program is of high quality and covers a broad range of topics within the field of operational research.

The COST Action FinAI, represented by its member Dolores Romeo Morales, co-organized the online seminar series "Machine Learning NeEDS Mathematical Optimization" (https://congreso.us.es/mlneedsmo/) with Emilio Carrizosa from IMUS-Instituto de Matemáticas de la Universidad de Sevilla, in collaboration with PhD Students Kseniia Kurishchenko from CBS, Cristina Molero Rio from IMUS, Jasone Ramrez-Ayerbe from IMUS, and Thomas Halskov from CBS. The seminar series is designed to provide an impactful platform for leading academics in the field of data science and analytics to share their latest research findings and developments, with a focus on the integration of machine learning and mathematical optimization. The seminar series includes a number of presentations from experts in the field who will cover important topics such as explainability, fairness, fraud, privacy, etc. Mathematical modeling and mathematical optimization will be at the core of their presentations. Additionally, the seminar series includes a YOUNG online seminar series on "Machine Learning NeEDS Mathematical Optimization", where in each session, three junior academics will show their latest results in this burgeoning area. The format of the seminar series is a weekly session that will take place every Monday at 16.30 (CET), starting on January 11, 2021. The seminar series is 100% online, and it will have speakers from around the globe. The seminar series is free thanks to the funding the EU gives to the H2020 MSCA NeEDS project, as well as the support given by IMUS-Instituto de Matemáticas de la Universidad de Sevilla. Shortly after each seminar, its video recording will be available at both the IMUS YouTube channel, as well as the NeEDS YouTube channel.	• Scientific / Technological • Economic • Societal	Achieved
The STSM (Short Term Scientific Mission) grant, developed by the COST Action FinAI is a program designed to encourage collaboration and the exchange of ideas, data, methods, and other resources among researchers in order to further advance research in specific fields. It helps to ensure that research outcomes are more widely applicable and widely disseminated throughout Europe, leading to more impactful outcomes. The grant has been significant in increasing international collaboration, publications, and result dissemination, and	• Scientific / Technological • Economic • Societal	Achieved

the quality of research outcomes has been increasing. The recent STSM grants have contributed to several specific research areas, such as the development of new algorithmic tools for anomaly detection in stock markets. This research, led by Apostolos Chalkis, contributes to a better understanding of risks and their causes in portfolio optimization, and also stimulates long-term scientific collaboration among universities and research institutions. Additionally, the computational tools developed as part of this research have been implemented in open-source packages, making them widely available to researchers and practitioners.

Another recent STSM grant led to the development of efficient geometric and computational tools based on semidefinite programming and random walks for studying Bayesian inference of systemic risk interlinkages. This research, led by Elias Tsigaridas, introduces advanced geometric, algebraic, algorithmic, and computational tools in computational finance and develops highly efficient mathematical software for various tasks, with the long-term goal of tackling problems that are currently intractable with available techniques. A prototype implementation in MATLAB with the corresponding algorithms has been developed.

Lastly, the STSM grant was used to evaluate sustainability goals at the European level from a spatial perspective using taxpayers' perception and sentiment analysis. This research, led by Coita Ioana-Florina and Belbe Stefana, contributes to structuring the research topic, methodology and extending the database of evaluations of sustainability goals at the European level from a spatial perspective using taxpayers' perceptions and sentiment analysis. This research aims at assessing sustainability at the institutional level in the financial domain using AI models that support transparency and help authorities discover fraudulent activities in a more efficient manner.

The objective of the VMG is to support collaboration and the exchange of ideas, data, methods, and other resources among researchers in order to increase the visibility and awareness of the COST Action and in the same time to support the advancement of the research in the fields covered by the Action. The supported VMG have also ensured that the research outcomes and their results have wider applicability and dissemination inside and outside the network. The supported VMG have also ensured that the research outcomes and their results are more broadly applicable and disseminated within and beyond the network. By increasing the visibility of the Action members' activities and the results they have achieved, the VMGs will also contribute to the Action's increased impact. Thus, the Virtual Mobility Grants have contributed to a large array of sub-topics of the COST Action contributing mainly to the increase of the awareness of the Action. Among the 12 virtual mobility grants supported during the second grant period 3 have directly contributed to deliverables of the Action and 9 have touched on topics ranging from involvement of females in FinTech to creation of video materials for facilitating the understanding of various data science and AI topics. Belma's VMG performed a bibliometric review on the topic of Venture Capital (VC) in order to improve the understanding of the VC environment that contributes strongly to the development and success of the FinTech industry. Alessandra's VMG proposed a survey to investigate basic perceived knowledge of FinTech innovations and of STEM and mathematical aptitude for different demographics. Wolfgang's VMG has improved the library of the Quantinar platform. Ioana's VMG has investigated the challenges of FinTech from both a regulatory and technology point of view. Codruta's VMG has supported the realization of the first FinTech report for Romania providing an overview of the sector. Maria's VMG focused on financial inclusion and on analyzing FinTech gender diversity in different EU countries. Barbara's VMG proposed an analysis of the gender and social	• Scientific / Technological • Economic • Societal	Achieved

connectedness of the editorial boards of finance journals. Shala's VMG supported the Datathon initiative developed in our Action bringing together students, academics and industry representatives around FinTech and AI topics. Esra's VMG analyzed the relationship between cashless economy and green growth within the framework of FinTech.		
Realization of a short-term teaching visit within the Erasmus+ teaching mobility programme, of the Action's participant and WG 2 Co-leader – associate professor Kristina Sutiene, PhD (F, ITC) from Kaunas University of Technology, Department of Mathematical Modelling, Lithuania to the Action's partner University of Zagreb, Faculty of Economics and Business, Department of Mathematics (ITC), in the period of May 2-6, 2022. Delivered topics included: Applications of stochastic dominance in decision making (mainly theory and examples of applications) Network analysis of financial markets (theory + examples with R) The visit was an opportunity to widen teaching practice in an international setting, with a group of students specializing in the field of economics and business, as well as to strengthen the existing, up-to-then online only, networking and to discuss possible cooperation in the future period. From the point of view of the host university, students had an opportunity to advance their knowledge and the faculty members benefitted as well from new approaches to subject matter.	• Scientific / Technological • Economic • Societal	Achieved
Elias Tsigaridas, through his research project "Efficient geometric and computational tools based on semidefinite programming and random walks for studying Bayesian inference of systemic risk interlinkages," utilized the Short-Term Scientific Missions (STSM) program to further collaborate with the team of Dr. Veni Arakelian and Dr. Apostolos Chalkis in the field of computational finance. The focus of this collaboration was to explore advanced techniques for geometric, algebraic, algorithmic, and computational tools, and to use these tools to develop highly efficient mathematical software for various tasks. The ultimate goal of this research was to address problems related to systemic risk interlinkages which are currently considered intractable using traditional techniques. During this STSM visit, the team focused on the problem of efficient Bayesian inference for Gaussian copula regression models. They employed semidefinite programming (SDP) and random walk techniques, and specifically the M1 and M2 algorithms, to improve the computational efficiency of their solutions. They also implemented a prototype of their developed algorithm in the Matlab programming language. This work aimed to not only improve the understanding of the underlying models but also provide a general framework that can be applied to other similar problems in the field of computational finance.	• Scientific / Technological • Economic • Societal	Achieved

Please describe how the Action is advancing the careers, skills and network of researchers, including ECIs (for example: joint supervision of graduate and PhD students, research exchanges not funded by the Action, collaborations, Training Schools with ECTS accreditation, joint projects and jobs prospects).

The COST Action FinAI has been actively working to advance the careers, skills, and network of researchers through various initiatives and activities. Some examples of what we have done include: Erasmus+ cooperations: Many of the Action members have established Erasmus+ cooperations with other institutions, which allow for researchers to spend time at partner institutions and collaborate on research projects. Joint research applications: The Action members have submitted several joint research applications to various funding agencies, which allows researchers to work

together on larger-scale projects and secure additional funding to advance their research. Additional joint research projects: Some of the Action members have established additional joint research projects with other institutions, which allow for the sharing of expertise and resources, and provide opportunities for networking and collaboration. Visiting professorships: Some of the Action members have hosted visiting professors from other institutions, which allow for the exchange of knowledge and expertise, and provide opportunities for researchers to learn about new research methods and technologies. Training schools: The Action has organized training schools in which researchers had the opportunity to learn new techniques and skills and also to contribute to their CV. All these activities are designed to provide researchers with a range of valuable opportunities to advance their careers, skills and network by working with a diverse group of colleagues, and learning about new research methods and technologies. The collaboration, sharing and exposure provided by the Action will help the researchers to stay current and updated in the field, and will provide them with a strong network of contacts and collaborators to support them in their future research and professional endeavors.

The career benefits are mainly to researchers with the following amount of experience after their PhD: 9–15 years.

Which of the stakeholders described in the "Plan for involving the most relevant stakeholders" in the Action's MoU have been engaged and how? What additional stakeholders have been, or will be, engaged and how?

The COST Action FinAI has taken steps to engage a variety of stakeholders including researchers, policy makers, industry players, and NGOs. This has been done through measures such as joint research projects, policy maker engagement, training schools, conferences and workshops, stakeholder surveys and interviews, active engagement through social media and the website, and involving Early Career Investigators. The Action plans to continue this engagement by regularly updating and involving stakeholders in the progress of the Action and its research output, and by updating and maintaining the stakeholder engagement strategy on an annual basis, identifying target stakeholder groups and preparing an engagement plan for them, extending the network to remaining European countries, and involving citizens engaged in science and citizen science organizations. The Action will strive for an inter-disciplinary and inclusive engagement strategy.

Dissemination and exploitation of Action results (other than co-authored Action publications listed previously)

Please describe the Action's dissemination and exploitation approach as well as all activities undertaken to ensure dissemination and exploitation of the Action results and the effectiveness of these activities.

Dissemination and exploitation approach of the Action

1. Open access of research (working) papers; 2. Clearly stated expected results of the projects and the main advantages; 3. Participation in conferences/seminars/round tables etc. to disseminate the results; 4. Active networking and inviting more members to COST Actions; 5. Website and Newsletter: www.fin-ai.eu. The website is updated with all the information about the action (articles, conferences, opportunities). A monthly newsletter is sent to the subscribers. The website contains information about our action participants, and both conferences and new articles. For seminars, we prefer to use the Fin–ai Meet up; 6. Organization of monthly series of open seminars conducted by Data Science Lab (headed by Piotr Wójcik) in cooperation with Quantitative Finance Research Group – both in the Faculty of Economic Sciences University of Warsaw where research done within the COST action or related to applications of ML/AI in finance is presented. 7. Source code publicly available at quantlet.com 8. Data sets, training and research material made available at quantinar.com

Dissemination

Dissemination meetings funded by the Action (possible only until 31st October 2021)

Title of Dissemination meeting	Meeting date	Meeting country	Action participant	Event name and hyperlink to the website	Title of presentation	Description of added value to the Action
N/A						

Other dissemination activities

E.g. participation to non-Action meetings, e.g. EU Parliament, meetings with policy makers, experts in the field, regional authorities.

Item/activity	Target audience	Outcome	Hyperlink
Organizing the BlackSeaChain 2022 conference, which took place September 1–2, 2022, in Varna, Bulgaria. It covered topics such as: the present and future of the decentralized economy and finance; the challenges in front of regulation; an introduction to Web 3.0; new crypto wallets	The target audience would be people from academia, industry, and practitioners in the field.	We received multiple submissions, of which 43 were presented at the conference. The conference was organized as an in-person event on September 1–2, 2022, in Varna, Bulgaria.	https://www.blackseachain.com/

and their future; the new craze in the world of cryptocurrencies—NFTs; innovative solutions with smart contracts; and integrations between blockchain technologies, the IoT, and AI. The main organizer of BlackSeaChain 2022 is the company Quanterall, owned by COST action member Anton Andonov. Partners are LimeChain, Nexo, Ambire, INDUSTRIA Tech, Hack.bg, ReCheck, Bithope, Motion Software, and WeiChain.			
Organization of a special session in the International Joint Conference on Neural Networks from the 18th of June to the 23rd of June 2023, hosted by the International Neural Networks Society with the title "Deep Learning for Financial Data Analysis." The session will likely feature presentations and discussions from experts in the fields of deep learning and financial data analysis who will share their research, insights, and perspectives on how deep learning techniques can be applied to analyze financial data. The session may also include demonstrations, interactive discussions, and opportunities for attendees to network with other researchers and practitioners in the field.	The target audience would be researchers, practitioners, and academicians who are interested in the application of deep learning techniques to financial data analysis. This would include individuals from fields such as computer science, statistics, finance, and economics, who are working in academia, industry, or government.	We received multiple submissions. The conference will be organized as a virtual conference.	https://2023.ijcnn.org/
Organizing collaboration activities between the New Bulgarian University (NBU) and Management Financial Group (MFG), Bulgaria. MFG is a group of leading European companies that specialize in non-banking financial services. New Bulgarian University collaborates with MFG in a joint effort to solve some of the most challenging tasks in FinTech using state-of-the-art AI techniques. Students from the Master's program "Knowledge Discovery and Big Data Analytics" are heavily involved in the majority of these activities.	The target audience would be academics, industry, and practitioners in this field.	Topical tasks in the FinAI field were given to students of the Master's program "Knowledge Discovery and Big Data Analytics." It was negotiated to continue the collaboration to achieve several main goals: - provide internship opportunities to the best students; - participate in the upcoming Black Sea Chain 2023; - expand academic activities at NBU.	https://managementfinancialgroup.com/

A workshop called "Environmental Finance for the Common Good." More details are summarized in the "Result" part.	The target audience would be academics, industry, practitioners in this field, policymakers, and civil society.	The workshop, co-organized by the Money, Macro, and Finance Society (UK) and the Department of Management, Birkbeck College, University of London, with the support of CA19130, saw a roundtable discussion on current challenges in environmental finance, open to the public. It acted as an evening public event featuring perspectives from industry, academia, and faith communities, and public lectures by Naoyuki Yoshino and Will Goodhart. Additionally, research papers were presented, and one was awarded the best paper by an ECI on fintech and AI topics.	https://efcg2022.sciencesconf.org/
Workshop: Diversity Challenges and Opportunities in FinTech (NAPLES) The workshop aimed to bridge academics and policymakers by discussing the novel challenges and opportunities in FinTech and AI, particularly in STEM, to deal with diversity. Among the main contributions: "A first step towards financial inclusion: assessing the role of digital payments during the pandemic using single item latent trait response models" (A. Di Iorio (Bank of Italy), M. Iannario (University of Naples Federico II), A. Nobili (Bank of Italy), and G. Rocco (Bank of Italy).	Academics, practitioners in this field, university students, and civil society.	The following results were achieved: - Working paper presentation: The inclusion of explainable AI approaches for well-being: theory and applications (M. Hudec, University of Bratislava) - Working paper presentation: A Bayesian network approach to statistical measuring and prediction of gender gaps: P. Vicard (Roma Tre University), L. Giammei (Sapienza University), F. Mecatti (Milano Bicocca University), F. Musella (Link Campus University, Rome), and S. Romio (Milano Bicocca University). - Keynote speech: "AI: Why diversity matters for an inclusive future" (R. Johri, Head of R&D at HSBC and Founder of London Women in Machine Learning) - Seminar session: "Financial knowledge and the use of old and new financial instruments - M. Albanese (University of Naples Federico); V. Vitale (University of Naples Federico): Master students from the University of Naples Federico II presented the results of their research about the impact of gender stereotypes on the self-concept of female students in STEM. A technical session	https://fin-ai.eu/diversity-workshop-naples2022/

		illustrated the latest research about financial inclusion and methods to improve diversity in FinTech, while the role of higher education in supporting diversity and allowing for inclusion in STEM fields was discussed during a round table. During the conference, a kick-off event for the "woman in fintech" datathon was also accomplished (https://fin-ai.eu/datathon/).	
Organisation of the Lake of Como School as an educational event that focused on the topic of neural networks and nets applied to finance. The goal of the school was to provide attendees with an in-depth understanding of cutting-edge methodologies and the applications of these technologies in the field of finance. Participants are expected to attend the school, which provides them with an opportunity to gain knowledge and insights from experts in the field, and to expand their understanding of the latest trends and developments in this area. The school includes lectures, seminars, hands-on workshops, and opportunities for attendees to network with other researchers and practitioners in the field.	The audience is primarily made up of PhD students and early-career researchers in this field.	This summer school provided training for 25 young researchers, and successfully reached its aim.	https://nnnf.lakecomoschool.org/
The International Fintech Research Conference from October 27–28, 2022, hosted by Politecnico di Milano and supported by the COST Action FinAI, brought together researchers in the field of Fintech from various areas such as banking, asset management, insurance, payments, capital markets, and the internet of things. The conference welcomed papers on a wide range of Fintech research topics, including theoretical analysis of finance and economics, machine learning applications to finance, cryptocurrencies, digital currency,	The target audiences were researchers and industries in the respective field with a strong background in finance, economics, and computer science. Additionally, industry professionals and practitioners who were interested in the latest developments and research in the field of Fintech were also targeted by this conference.	The conference received a total of 35 paper submissions, of which 24 were accepted for presentation at the conference. In addition to this accomplishment, the conference also served as an opportunity for researchers to submit their work for consideration in a special issue of Springer Digital Finance.	https://www.fintechlab.it/fintech_conference2022/

cybersecurity, neural networks, smart contracts, peer-to-peer finance, big data analysis, nowcasting, text analysis in finance, blockchain technologies, network analysis in finance, and behavioral finance.			
The "Woman in Fintech Datathon" is an event organized by the Women in Fintech Conference Committee, in collaboration with the University of Tirana and the University of Naples Federico II with the support of the COST Action FinAI. The event is a data mining and analysis competition, with the goal of promoting the analysis of data related to the goals of the Women in Fintech Conference. The goal of the Datathon is to encourage the use of data analysis to understand and promote the goals of the conference and the field of Cost Action FinAI. The participating teams were from Albania, China, Germany, Ghana, Greece, Italy, India, Kosovo, Lithuania, and Romania.	Master and/or PhD students in early stages of their career with an interest and background in data analysis, specifically in the field of Fintech and Artificial Intelligence in Finance. Female researchers working in the field of Fintech and Artificial Intelligence in Finance are especially targeted.	The event attracted a total of 18 teams, comprising 46 participants, of whom 33% were male. The participants were tasked with utilizing quantitative approaches to produce written reports on the topic of financial inclusion. The reports were based on an analysis of data from the Global Findex database, maintained by the World Bank, with the goal of uncovering various financial characteristics of a global sample of individuals. The event aimed to provide valuable insights into the field of financial inclusion, utilizing a rigorous data-driven approach to generate meaningful results.	https://fin-ai.eu/datathon/
Organisation of a special issue in the journal "Digital Finance." The issue aimed to explore the impact of new technologies on the financial industry, which is experiencing a significant disruptive moment referred to as the "fintech revolution." The journal invited submissions that use various research methods and theoretical frameworks to better understand the fintech phenomenon, with a focus on topics such as the use of artificial intelligence in finance, cryptoassets, blockchain technologies, smart contracts, and more. The special issue is in line with an "International Fintech Research Conference" that will be held in Milan in October 2022.	The target audience is academics with a particular interest in finance, economics, computer science, and related fields.	Issuance of a call for papers on the theme of fintech, specifically exploring the intersection of digital finance, emerging technologies, and innovative methodologies. Submissions were seeded that offer rigorous, in-depth examination of the various facets of the fintech landscape, including but not limited to topics such as: - The impact of digital technologies on financial service delivery and the customer experience - The emergence of new players and business models in the financial sector - The application of Artificial Intelligence and machine learning techniques to financial problem-solving - The analysis of cryptoassets as a new class of financial instruments - The implications of smart contract technology and decentralized finance - The use of big	https://www.springer.com/journal/42521/updates/23290068

		data analytics, nowcasting and text analysis in finance - The role of network analysis in understanding financial systems - The examination of behavioral finance in the digital age.	
Organization of a monthly series of open seminars conducted by the Data Science Lab (headed by Piotr Wójcik) in cooperation with the Quantitative Finance Research Group. Both organizational bodies are hosted in the Faculty of Economic Sciences at the University of Warsaw. The achieved research output was related to applications of machine learning and artificial intelligence in finance.	The target audience would be for academics, industry, and practitioners in the field.	Informing a wide audience about our COST action, increasing action visibility, and increasing understanding of XAI tools among financial practitioners (e.g., 2021-04-19: Chlebus Marcin, "XAI Tools as a Part of the Best Practices in Model Selection for Business Decision Modeling"); – related to MoU objectives 9 (Capacity Building 3), 10 (Capacity Building 4) and 15 (Capacity Building 9).	https://qfrg.wne.uw.edu.pl/?p=1102

Exploitation activities

Please describe below any activities undertaken to ensure exploitation (use, in particular in a commercial context) of the Action's achievements.

Item/activity	Target audience	Outcome
Application of knowledge about specific XAI tools gained on WG2 seminars in daily business practice of Marcin Chlebus, vice CEO in Data Juice Lab, consulting company operating mainly in financial sector, application of XAI methods in FinTech projects in the area of Risk Modelling, Marketing campaigns, Human Resources and CRM. https://www.datajuicelab.com/	Companies operating in Risk Modelling, Marketing campaigns, Human Resources and CRM	Thanks to regularly organised COST action research seminars and meetings current knowledge about XAI in Finance has been acquired. The findings were effectively implemented in commercial projects. Usage of XAI methods led to the improvement of the quality of created models and to better understanding by business users of how the algorithms make decisions.
Development of Quantinar (Quantinar.com): Quantinar is a platform that focuses on providing data science education through a lecture-based approach, allowing learners to apply their skills through the execution of real-world projects. The platform is developed by several COST Action FinAI members, centered around Wolfgang Karl Härdle and his research team from Humboldt University Berlin. Researchers as well as students have the option to acquire course materials about statistical and programming-related tasks, including lecture material,	The target audience is aimed at research students as well as young researchers, but also accounts for more experienced scholars in terms of the variety of offered course-lets.	The output of the platform resulted in a huge amount of open-access course-lets that span across the fields of machine learning, fintech, cryptocurrencies, data science, blockchain, and statistics.

mostly for free. The course-lets are designed according to different difficulty levels and provide a good starting point for students with non-technical backgrounds, as well as advanced training options for more experienced scholars.

Several members of the COST Action FinAI under the lead of Wolfgang Karl Härdle developed the platform Quantlet (www.quantlet.de): Quantlet is designed as a web-interface to freely exchange numerical methods, called Quantlets. Quantlet aims to introduce a centralized system that is constituted by documents from different scientific areas, submitted by various authors from professional researchers to university students. As part of the Collaborative Research Center, the Center for Applied Statistics and Economics and the International Research Training Group (IRTG) 1792, Quantlet contributes to the goal of strengthening and improving empirical economic research in Germany. At present Quantlet contains source code written mainly in: Python, R, C++, Solidity, Matlab, SAS	The main target audience for Quantlet lies in researchers and academics who are interested to share and retrieve programming code for specific statistical use cases and model conceptualization.	- Open access to all research and teaching related codes and programs, - Reproducibility of research results increases its accountability and reliability, - Full integration with GitHub, implemented with PyGithub package available on PyPI - Text Mining Pipeline providing Information Retrieval, document clustering and visualizations realized with a "GitHub API based Quantlet Mining infrastructure in R" - Ease of discovery and use of your technology and research results, everything in a single GitHub Markdown page - Standardized audit of your codes based on the StyleGuide
As part of the dissemination of the research output done within the COST Action FinAI and in order to further raise the attention on the scientific matter of investigating the use cases of artificial intelligence in finance, we also organized a meetup group (https://www.meetup.com/fintech_ai_in_finance/) that regularly updates all group participants with news on talks, seminal paper presentations, conference events, and working group meetings. The meetup-group currently circumvents around 2080 participants and provides the COST Action FinAI with an interactive platform to connect with researchers as well as interested individuals to discuss ongoing scholarly matters in the field of finance and AI.	Interested scholars as well as private individuals are free to join the meet-up group and receive the latest notifications on the research output generated by the COST Action FinAI.	Over hundreds of organized meet-up events including research seminars delivered by the core working groups WG1, WG2, and WG3 as well as interactive online break events have produced a rich community of interested and active scholars that regularly participate in the action.
The formation of the fintech community: fintech.mk (https://www.linkedin.com/company/fintech-mk?viewAsMember=true). This is the first fintech community in North Macedonia that intends to develop and facilitate the regional Fintech Ecosystem. It is a non-profit organization that provides IT and consulting services. The community routinely publishes fintech-related articles. Members of the Action from North Macedonia (Petre Lameski, Olivija Filipovska, Tatjana A. Pachemska, Eftim Zdravevski, Goran Petkovski, and Miroslav Mirchev) actively contributed to the website's construction and article writing.	Researchers interested in Fintech, Financial Companies, Investors, and Readers who are curious about the application of AI in Finance.	The community routinely publishes Fintech-related articles at: https://fintech-mk.medium.com. Currently, the community has 28 members and has authored thirteen articles in English and Macedonian.

Other matters

This section is confidential to the Management Committee, the Action Rapporteur and the COST Association, and is not included in the version of the report that is published on the COST website.

Difficulties in implementing the Action

If any difficulties are experienced in the implementation of the Action (e.g. imbalances of participation across the Working Groups, inactive country representatives) please describe these below. Please also describe the efforts made by the MC to address these.

> Objective 6 cannot be achieved due to the regulatory landscape in Europe.
> We are proposing to replace this objective with the following:
>
> Creation of a stable, fully transparent and reproducible stable European platform to help the continuing education of academics and the general public on Fintech and AI in Finance, with a focus on transparency in Finance.
>
> This new objective would have a substantially larger impact on the outcome of our COST Action and would be much better in line with academic, regulatory and industry developments since the start of the Action.
>
> The initial objective has fundamentally been dependent on regulatory changes in Europe to make this data available. Those changes have not happened. Therefore, just from a legal point of view, it is not feasible to build this platform.
>
> In any case, the newly proposed objective is in line with the entire Action, the needs and requirements of all workings groups, all stakeholders and the future direction of any research in that area.
>
> Indeed, the newly proposed objective has been and is so fundamental to our Action, that we have already achieved a substantial part of it.

Endangerment Measures

Taking into account the issues identified throughout this report, please summarise the measures the Action will implement in the coming two years to overcome any issues identified as potentially endangering the achievement of the objectives of the Action.

> We are pleased to report that our Action, COST Action CA19130 Fintech and Artificial Intelligence, has experienced significant growth and success. Our collective output and achievements have exceeded our initial objectives, and we do not currently see any issues that could potentially endanger our progress. In the grant period, we aim to complete the majority of our objectives in GP3, and we are excited to use GP4 to extend and improve upon our work, as well as to incorporate new challenges and research topics that have arisen as a result of our research efforts. The only exception is MoU Objective 6. Due to the changing regulatory landscape in Europe, enhanced privacy, data protection and regulatory requirements, it is not possible anymore to proceed with this objective. We are proposing to replace it with a related objective, with a substantially higher impact and importance for the purposes and outcome of our COST CA19130 Action.

Suggestions for improvements to COST framework/ procedures

The mandate of the Scientific Committee includes providing advice to the COST Committee of Senior Officials on possible improvements to the COST framework. Please describe below any improvements that you believe should be made to the COST framework.

All members of the COST Action CA19130 Fintech and Artificial Intelligence are wholeheartedly convinced that COST Actions are a tremendous achievement and the most important and most substantial contributors to the academic landscape in Europe. All members of the COST Action CA19130 Fintech and AI in Finance want to express their support for the COST program and their appreciation for the work that the organization does. COST CA19130 members have been able to benefit from the numerous opportunities for collaboration and knowledge exchange that COST provides. We believe that the COST program is an invaluable resource for researchers and other professionals across Europe, and we are grateful for the support and funding that COST has provided to our Action. In our opinion, COST is the best framework for fostering collaboration and driving scientific and technological progress in Europe, and we hope that the organization will continue to thrive and grow in the future.

Sustaining the network beyond the Action

Are there any plans to sustain the network beyond the end of the Action?	YES

Please describe how the network will be sustained beyond the end of the Action.

The COST Action FinAI network will be sustained beyond the end of the Action through a variety of efforts. One of the key ways to maintain the network is through continued collaboration and communication among the members. This will be achieved by organizing regular workshops and conferences and the use of online platforms for communication and collaboration. To support this goal, we have a google groups and a webpage where members can share information and updates, discuss ongoing projects and research, and stay connected with one another.

We will continue to publish research and share findings with the broader community, by submitting papers to peer-reviewed journals, industry publications, and presenting at conferences and other events. Moreover, we have also set up an online platform for research, code and papers where members can share their work and findings to the community.

In addition, the Action can also sustain the network by ensuring the preservation of knowledge and resources generated during the Action. This will include documentation, codes and software, datasets, and other materials that will be made available online and shared with the community.

Overall, the COST Action FinAI network will be sustained long after the lifetime of the Action.

Emerging topics/ developments in the field of the Action

Please describe any emerging topics or potentially important future developments identified during the Action and that could potentially be addressed by future COST activities such as Actions S&T Conferences or Exploratory Workshops.

During the COST Action FinAI, several emerging topics have been identified in the field of Fintech and AI in finance. The increasing use of Artificial Intelligence and Machine Learning in financial institutions and fintech companies to optimize business operations and decision making is one of the most notable areas. This includes the use of AI to improve financial forecasting, portfolio management, fraud detection, and customer service, as well as to develop new financial products and services. Another emerging topic is the increasing use of blockchain technology in finance, particularly in the areas of digital currencies, smart contracts, and decentralized finance (DeFi). The use of blockchain technology has the potential to revolutionize traditional financial services, by creating new forms of digital assets, as well as new forms of financial intermediation. Additionally, Explainable AI (XAI) is becoming increasingly important as a regulatory and societal requirement in order to understand, trust and explain the functioning of AI-based decision-making systems. Furthermore, there is growing concern of privacy and data protection in financial AI and fintech which also important. Future COST activities such as Actions, S&T Conferences, or Exploratory Workshops can focus on these areas in fintech and AI in finance.

Annex 1: Types of objectives

1 - Coordination of scientific and technological activities at a European level

1.a - Development of a common understanding/definition of the subject matter

1.b - Coordination of information seeking, identification, collection and/or data curation

1.c - Coordination of experimentation or testing

1.d - Comparison and/or performance assessment of a theory, model, methodology, technology or technique

1.e - Development of knowledge needing international coordination, pertaining to a new or improved theory, model, methodology, technology or technique

1.f - Achievement of a specific tangible output that cannot be achieved without international coordination (e.g. due to practical issues such as database availability, language barriers, availability of infrastructure or know-how, etc.)

1.g - Input to stakeholders (e.g. standardization body, policy-makers, regulators, users), excluding commercial applications

1.h - Input for future market applications (including cooperation with private enterprises)

1.i - Dissemination of research results to the general public

1.j - Dissemination of research results to stakeholders (excluding specific input in view of knowledge application)

2 - Community building

2.a - Building a community around a topic of scientific and/or socio-economic relevance, allowing for knowledge exchange and the development of a joint research agenda

2.b - Building a community around a new or emerging field of research

2.c - Bridging separate fields of science/disciplines to achieve breakthroughs that require an interdisciplinary approach

2.d - Acting as a stakeholder platform or trans-national practice community, pertaining to a certain area of socio-economical or societal application, or to a certain market sector

2.e - Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action

Annex 2: Dimensions of successes

1 - Breakthroughs

    1.a - Scientific breakthrough

    1.b - Technological breakthrough

    1.c - Breakthrough in socio-economic or societal applications

2 - Policy contribution

    2.a - Contribution to regulatory policy

    2.b - Contribution to environmental, infrastructural or agricultural policy

    2.c - Contribution to economic or socio-economic policy

    2.d - Contribution to social, cultural or legal policy

3 - Capacity building

    3.a - Building capacity in an existing field of science and technology

    3.b - Building capacity in bridging separate fields of science and technology

    3.c - Building capacity in a new or emerging field of science and technology

    3.d - Building capacity in valorising and implementing advances and applications in science and technology

    3.e - Building capacity in the demographic inclusiveness of networks in science and technology, including representation of newly established research groups, Early-Career Investigators, the under-represented gender and teams from countries/regions with less capacity in the field of the Action