

Report on the outcomes of a Short-Term Scientific Mission¹

Action number: CA19130

Grantee name: Esra Kabaklarlı

Details of the STSM

Title: The Role of Green Fintech in Promoting Economic Growth, Evidence From The OECD Countries: Panel Data Analysis

Start and end date: 27/08/2023 to 31/08/2023 (5 days)

Description of the work carried out during the STSM

I attended the summer school held in Berlin from the 28 of August to - 1st of September 2023 COST Fintech and Artificial Intelligence in Finance Summer School 2023 “Data Science For Sustainable Finance And Economics” summer school was a fruitful opportunity for the consortium partners to collaborate, share knowledge, and plan the next steps in our academic projects. I made a presentation to the master's and Ph.D. students who attended the summer school titled “The Role of Green Fintech in Promoting Economic Growth, Evidence From The OECD Countries: Panel Data Analysis”. Students had information about green FinTech and our Cost action CA19130 activities.

I had the opportunity to collaborate with Prof.Dr.Alla Petukhina, Prof. Dr. Christina Erlwein-Sayer, Prof. Dr. Nataliya Togobytska , Prof. Dr. Jan-Alexander Posth, Prof. Dr Alessandra Tanda and their team from Hochschule für Technik und Wirtschaft Berlin.

Description of the work carried out during the STSM to create a multi-national network of participants (Esra Kabaklarlı (COST Action 19130, WG 1&2. Associate Professor at Selcuk University Department of Economics), Alla Petukhina (COST Action 19130 member of WG1 , Hochschule für Technik und Wirtschaft Berlin, Fatma Sayed Gadelrab (COST Action 19130, WG1, PhD in computers and information), Chemseddine TIDJANI Member at (COST Action FinAI, PhD in financial & economic studies, Senior Researcher at Centre for Research in Applied Economics Algeria) and Albulena Shala (COST Action 19130, WG1,2,3. Research Assistant, University of Prishtina, Gjorgj Bushi, Kosovo) examining the The Role of Digital Technologies for Female Workers Nexus Fintech : panel data analysis for selected OECD countries to gain a deeper and more understanding of the phenomenon. We are working on a scientific paper, **We are planning to submit it to Frontiers in Applied Mathematics and Statistics journal (Advanced Statistical Modelling for Fintech, Financial Inclusion, and Inequality).**

The primary purpose of this research is to analyze the relationship between the female labor force participation rate and information and communication technologies (ICT) within the fintech framework. Female labor force

¹ This report is submitted by the grantee to the Action MC for approval and for claiming payment of the awarded grant. The Grant Awarding Coordinator coordinates the evaluation of this report on behalf of the Action MC and instructs the GH for payment of the Grant.

participation rate is lower than men due to cultural norms and development levels. There is much research about the labor force participation rate and economic development level in the literature but not many researchers have assessed the outcomes of ICT on labor market, particularly female labor. Fintech, which delivers financial services digitally, promises to promote financial inclusion and increases the female labor force participation rate in labor market.

Data and Methodology

This joint paper outlines the interconnection between the female labor participation rate, ICT, GDP per capita and female internet use nexus fintech. In the empirical section, panel data analysis, the impact of ICT on female labor participation rate will be applied to the selected countries 2010-2021. In this paper, a regression has been formed to point out the relationship between ICT, fintech and female labor participation rate using the Random and Fixed Effect Models along with the Driscoll-Kraay standard error Estimators for selected 26 OECD countries in the period between 2010-2021. These selected countries are Türkiye, UK, Sweden, Slovak Republic, Austria, Spain, Belgium, Denmark, Czech Republic, Lithuania, Netherlands, Estonia, Norway, Finland, France, Poland, Germany, Portugal, Greece, Israel, Slovenia, Italy, Hungary, Ireland, Latvia, Mexico. In this project, we will explore available datasets for the interconnection between the female labor participation rate, ICT, GDP per capita and female internet use nexus fintech.

$$\ln Female Labor_{it} = \alpha_i + \beta_{1i} \ln GDP_{it} + \beta_{2i} \ln FinTECH_{it} + \beta_{3i} \ln Internet_{it} + \beta_{4i} \ln Mobile_{it} + \varepsilon_{it} \quad (1)$$

At the beginning of the analysis, random and fixed effect method will be used in panel data to analyze ICT impact on the female labor participation rate. When u_i 's are supposed to be random variables and uncorrelated with X_i variables, most methods use random effects (Baltagi, 1995).

$$Y_{it} = X_{it} \beta + \mu_i + u_{it} \quad (2)$$

If there is no correlation between X variables and μ , the random effects estimator is consistent (Wooldridge, 2002). Hausman test will be used in panel data to choose the best method for analysing ICT and fintech impact on female labor participation rate.

In the study, random and fixed effects panel data models were estimated with dependent and independent variables definitions summarized in Table 1. When the two models are compared using the Hausman test, the random effects model is consistent if there is no unit effect correlation with the explanatory variables, according to the alternative hypothesis. The fixed effects panel data application considers natural, geographical, and population differences among the countries covered in the model. In contrast, the change in the time dimension of these differences is ignored. In addition, the estimators of the random effects model are biased and inconsistent when unobserved within-group effects are correlated with explanatory variables (Asteriou and Hall, 2021). The Hausman test, summarized below (table 2), was applied to choose between the random or fixed effects model in panel data analysis.

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Description of the STSM main achievements and planned follow-up activities

Description and assessment of whether the STSM achieved its planned goals and expected outcomes, including specific contribution to Action objective and deliverables, or publications resulting from the STSM. Agreed plans for future follow-up collaborations shall also be described in this section.

Description of the work to be carried out by the applicant.

I have attended the **summer school which held in Berlin from the 28 of August- 1 September 2023** COST Fintech and Artificial Intelligence in Finance Summer School 2023 “Data Science For Sustainable Finance And Economics” summer school was a fruitful opportunity for the consortium partners to collaborate, share knowledge, and plan the next projects (Horizon calls and Erasmus + Projects with Prof.Dr.Alla Petukhina, Prof. Dr. Christina Erlwein-Sayer, Prof. Dr. Nataliya Togobytska , Prof. Dr. Jan-Alexander Posth, Prof. Dr Alessandra Tanda and their team from Hochschule für Technik und Wirtschaft Berlin)

As a result of this STSM , We are working on a scientific paper with Fatma Sayed Gadelrab (COST Action 19130, WG1, PhD in computers and information), Chemseddine TIDJANI Member at (COST Action FinAI, PhD in financial & economic studies, Senior Researcher at Centre for Research in Applied Economics Algeria) and Albulena Shala (COST Action 19130, WG1,2,3. Research Assistant, University of Prishtina, Gjorgj Bushi, Kosovo)

We are planning to submit it to Frontiers in Applied Mathematics and Statistics journal (Advanced Statistical Modelling for Fintech, Financial Inclusion, and Inequality).

1. Research coordination and Literature Review : In line with this one, this application is made for, conceptualizing/theorizing the main characteristics of proxy variables as female using the internet, and mobile broadband are proxies for ICT. Fintech includes mobile banking, online banking , digital banking and online payment (Lu et al., 2023). Female using Internet banking is a proxy for Fintech in the econometric modelling. As done by Xiao et al. (2023), Chen et al. (2023), Zhao et al. (2023).

2. The methodology pursued for this research is an interdisciplinary research benefited from the literature of fintech. This intensive research is based on a comprehensive literature review (a couple of sources including books, and a variety of journals) and data collection (OECD, ITU, Eurostat statistical sources) and official documents conducted from diverse sources, particularly the Library of the visited Institution/or its publications; and also on the effect of efficient discussions made by those researchers/scholars of the Institution.

Therefore, the research visit was planned for 5 days, using sources for full-time work.

3. Techniques to Learn

- Techniques/ways of creating and managing interactions between fintech, female labor, and GDP. We intend to apply the System Generalized Method of Moments (sysGMM) and Machine Learning approach to analyze The Role of Green Fintech in Promoting Economic Growth. The use of sysGMM can provide valuable insights into the relationship between these variables estimating parameters and analyzing panel data. The sysGMM methodology is commonly used in econometrics and social sciences to address endogeneity and other issues related to panel data analysis.

4. Collobaration between Cost 19130 member

I had opportunity for implementing a project with an international team and gained new knowledge or access to equipment or techniques not available in the home institution (HTW Berlin University) with Prof.Dr.Alla Petukhina, Prof. Dr. Christina Erlwein-Sayer, Prof. Dr. Nataliya Togobytska , Prof. Dr. Jan-Alexander Posth, Prof. Dr Alessandra Tanda and their team from Hochschule für Technik und Wirtschaft Berlin.

In this regard, this research work will be established with the following participation plan:

Expertise /contribution Invited participant(s)/collaborator(s)

Conceptualization & theorization • Esra Kabaklarli (COST Action 19130, WG 1&2. Associate Professor at Selçuk University Department of Economics) and Alla Petukhina (COST Action 19130 member of WG1 , Hochschule für Technik und Wirtschaft)

Modelling/ Empirical analysis and predictions using the neural Network analysis through machine learning techniques. • Fatma Sayed Gadelrab (COST Action 19130, WG1, PhD in computers and information)

• Chemseddine TIDJANI Member at (COST Action FinAI, Ph.D. in financial & economic studies, Senior Researcher at Centre for Research in Applied Economics for Development, Algeria)

Literature review/discussion • Albulena Shala (COST Action 19130, WG1,2,3. Research Assistant, University of Prishtina, Gjorgj Bushi, Kosovo)

5. Future Plans: In addition, during my visit, we worked on preparing common potential projects with a focus on the ITC countries and discussed research activities for the development of a common research project or Horizon Europe and Erasmus + projects also next year's summer school about green fintech and green finance.

coordination and/or capacity-building objectives) and deliverables.

• CA19130 - Fintech and Artificial Intelligence in Finance - Towards a transparent financial industry (FinAI) network will bring definite value to European initiatives on social innovation. The knowledge that the network will bring together and consolidate will also be valuable for other researchers and scholars examining the collaborative economy from other perspectives.

• Networking will establish an innovative and multidisciplinary community of committed researchers, practitioners and organizations, which will work in a concerted way towards the creation of a European research agenda for studying the fintech in Europe; the presence of a partner from outside Europe in the network will allow us to compare practices and mechanisms.

• Creating a repository of case studies and undertaking a comparative analysis between them. This STSM brought together leading researchers, practitioners and activists engaged in the study and in the realization of fintech initiatives across Europe and beyond setting up collaborative project proposals with the visited Institution/ or with researchers individually;(Horizon Europe 2023-2024 project clusters)

• Facilitating dialogue with researchers/ scholars concerned with the same topic/or related ones;

Capacity building: Following this one,

• I am a researcher from one of the COST Inclusiveness Target Countries (ITCs) countries, Turkey;

• Through my research visit, one of my objectives is to produce new partnerships and collaboration on the topic;

The output of this STSM was to initiate new research collaboration between our respective home and host departments (Selçuk University and HTW Berlin) on two lines of importance to the COST action, financial intelligence and the application of fintech to digital financial inclusion

One of the main goals of COST Action 19130 is to promote and encourage interdisciplinary teams working around the world with different backgrounds. The invitation to contribute to the special research topic boosts the idea of inviting interested researchers for such a collaborative research paper.

This STSM allows for fostering a solid collaboration and involvement of invited researchers to arrive at econometric techniques, analysis, and discussion of research findings. In addition, the STSM outputs will be realized under the main goals and MoU objectives of the COST Action in particular:

- We are planning to develop mixed approaches, by using the panel data fixed and random effect analysis, GMM model & Neural Network analysis, with the aim is to explore and predict the interrelations among fintech, digital financial inclusion, female labor participation rate (this is evident in line with Research Coordination 1)

- We are coordinating to bring technological, quantitative and economic researchers together, with interdisciplinary backgrounds, capacities, skills, and making contributions to the wide landscape of FinTech, green technologies and economic growth in comparison to other findings and results from Europe (this is evident in line with Capacity Building 2)
- We are trying to establish an inclusive and continual community of researchers, on methodological and technological practices in Machine Learning and econometric methods to promote small hubs, who should be experts in a particular field. (This is evident in line with Capacity Building 5)
- We effectively engage to ensure wide dissemination and sharing of the main findings of this research, through multiple WGs (1,,3) activities, Diversity Group meetings and among scientific communities, and scholars (podcasts, seminars, workshops, webinars, ...etc) (This is evident in line with Capacity Building 9)
- We are working on a joint paper that examines **The Role of Digital Technologies for Female Workers Nexus Fintech: panel data analysis for selected OECD countries to gain a deeper and more understanding of the phenomenon. We are working on a scientific paper, **We are planning to submit it to Frontiers in Applied Mathematics and Statistics journal (Advanced Statistical Modelling for Fintech, Financial Inclusion, and Inequality).****

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