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# Financial Landscape Transformation: Technological Disruptions

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# Foreword

This collection of academic papers explores the complex relationship between technological progress and economic occurrences in the fast-changing financial environment of the current day. The convergence of finance and technology, commonly called 'Fintech', has enabled groundbreaking advancements and substantial transformations in the financial sector. The authors do a comprehensive examination of the relationship between the expansion of the insurance sector and foreign direct investment (FDI) through a panel cointegration analysis. They highlight the crucial role that robust insurance markets play in fostering a conducive environment for foreign investments.

The influence of artificial intelligence (AI) on personal and business finance is a noteworthy topic of concern in this compilation. The authors comprehensively analyze the available literature to assess the present status of AI implementations in the banking sector. They meticulously assess and debate the prospective benefits and challenges predicted. This extensive inquiry provides the groundwork for future research to use the potential of AI in revolutionizing financial decision-making, risk management, and consumer contact.

An in-depth comprehension of significant price fluctuations and alterations in volatility factors is essential in financial markets. The authors employ a thorough case study on Borsa Istanbul, examining the atypical price swings and their underlying causes. Examining extraordinary events enables market participants to develop essential inferences that aid in predicting and mitigating risks linked to financial trading and investing.

Digitalization has dramatically transformed the consumer experience, notably affecting customer happiness and loyalty. This book analyses digital banking services to explore the crucial factors that impact customer involvement in the digital era. A thorough comprehension of these dynamics allows financial institutions to develop more effective strategies to enhance service delivery and foster long-lasting customer relationships.

Stock market investors are perpetually concerned about inflation and abrupt fluctuations in oil prices. This compilation employs empirical research to elucidate the intricate interrelationships between macroeconomic factors and stock market results. The authors offer crucial guidance for investors and policymakers to create more robust investment portfolios and adopt creative economic policies to address macroeconomic volatility.

This report does a comparative analysis of the regulatory frameworks in Central and Eastern Europe for fintech startups. The article highlights the different

approaches countries use to overcome the regulatory challenges posed by breakthroughs in fintech. The book offers valuable perspectives on how various regulatory frameworks can either support or hinder the progress and development of fintech.

Innovation is the primary focus of the future of fintech, uncovering new opportunities and challenges. Understanding the potential of blockchain technology is crucial for enhancing the efficiency and security of fintech firms. It is essential to thoroughly analyze the significant possibilities of blockchain and develop a clear plan for integrating it into the financial ecosystem.

The advent of virtual currencies and decentralized metaverse introduces unprecedented financial dynamics and user interaction patterns. The authors examine the analytical systems present in the metaverse and uncover innovative approaches to creating and exchanging value, which have the potential to revolutionize the future of finance.

The analysis of cognitive biases in decision-making about bitcoin investments is under serious scrutiny. This study focuses on comprehending behavioural finance principles when developing investment strategies and regulatory frameworks for digital assets.

A significant field of research focuses on the impact of currency devaluation on inflation, specifically in Sri Lanka. By comprehending this association, economists and policymakers can augment their capacity to moderate inflationary forces and promote stability within their economies.

Regulatory Technology (RegTech) can revolutionize compliance and regulatory operations entirely. This book explores the policies and practices that impact the developing field of RegTech in Bangladesh. The comprehensive examination centres on the digital revolution of the insurance industry, referred to as InsurTech, and the broader financial transformation commonly known as FinTech.

Enjoy your reading!



**Prof Dr Ibish Mazreku**  
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# Preface

Financial Technology has emerged as the new disruption in the world of finance. Finance technology is evolving and expanding rapidly with innovations. The scope of technology in finance is growing across the world. The integration of technology into the financial process is referred to as fintech. Fintech has enhanced the degree of automation in the financial services sector. Financial applications thrive to enhance outcomes for various stakeholders, including consumer firms, by leveraging tailor-made algorithms and computing applications. Financial technology is being employed to enhance the efficiency of operations, streamline processes, and reduce costs for the firms and ease of use for consumers. Smartphones' rapid penetration and expansion have been instrumental in adopting financial technology.

Financial technology is a bigger umbrella, which includes machine learning, AI, blockchain, cryptocurrencies, and core banking solutions. It includes applications run on mobiles and technologies that offer automation and enhance the traditional banking financial services and insurance sector processes. The traditional approach to financial services has gone through a paradigm shift with the evolution of technology in finance. Technology has overcome the barriers of time and distance for customers by enhancing the satisfaction of financial services with better speed, convenience, and access and integrating financial transactions with other transactions across the sectors.

This book culminates discussions and interactions between finance experts, bankers, academicians, researchers, technocrats and entrepreneurs. It was observed that it is paramount to navigate and assess the developments in financial technology to explore new avenues, improve existing practices, and develop solutions for the challenges concerning fintech usage by the various stakeholders. The intention of coming out with this book is to compile and share critical insights after evaluating them for academic rigour and assessing them for the feasibility of implementation by the organizations. This book attempts to bridge the gap between theory and practice. Every chapter focuses on a specific domain and aspect of financial technology, exploring stakeholders' understanding and experiences. The book provides a comprehensive framework for better application of technology for current usage and for addressing the needs of future generations.

We are grateful for the efforts of researchers from across the world who have shared deep insights with readers. This book will guide individuals and firms willing to explore integrating technology with financial wisdom to achieve better outcomes. The book could not have reached the final shape without the efforts

of peer reviewers and stakeholders to evaluate the contributions and provide input for improvement thoroughly. We express our gratitude to all reviewers and experts.

The book will be useful for students, academicians, practitioners, and policymakers. We urge the readers to explore the insights and share their experiences after implementing them in their respective firms. Financial technology is evolving and offering opportunities and challenges. The opportunities can be converted into useful outcomes, and challenges can be overcome by precision planning, analytics debate, comprehensive evaluation, and assimilation of new ideas. The journey of fintech can be revolutionary for developing sustainable solutions for stakeholders.

Thank you for embarking on this journey with us.

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## Chapter 1

# A Panel Cointegration Analysis of Insurance Development and FDI Nexus

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### Abstract

*Introduction:* The possible role of foreign direct investments (FDIs) in the insurance services industry has not received much research compared to the banking industry. The FDI inflows are seen as crucial to the general economic growth of these emerging European transition countries because the insurance sector is still growing and integrating.

*Purpose:* This chapter explores whether the increase in FDI inflows leads to higher life and non-life insurance penetration in different groups of European transition countries and European post-transition countries.

*Methodology:* The study employs annual data between 1995 and 2021 using dynamic ordinary squares (DOLS) estimator and [Dumitrescu and Hurlin \(2012\)](#) panel causality methods.

*Findings:* The study found evidence about the link between FDI and life and non-life insurance penetration, where their gains are marginal and very weak when controlling the effect of Gross Domestic Product per capita (GDPPC) in the long run. More specifically, the effect of FDI on insurance development is greater in the European post-transition countries with higher GDPPC and FDI inflows than in the European transition countries.

These discrepancies may be attributed to the various stages at which their development policies have advanced as well as the overall execution of

reforms within the insurance industry. The findings suggest affirmative action programs should be put in place to attract FDI inflows in general and insurance in particular.

*Keywords:* Life insurance; non-life insurance; FDI flows; transition countries; panel cointegration analysis; Granger causality; DOLS estimator

*JEL Codes:* F21; G22; E22

## Introduction

Numerous profitable industries, including manufacturing, services, real estate, and insurance, are impacted by flows of foreign direct investment (FDI). The amount and value of assets can be significantly impacted by FDI in the insurance sector. It is crucial to make sure that the quality, dependability, and insurance costs of domestic businesses are not jeopardized because different strategies can have varied effects. Insurance rates for domestic enterprises could increase if there is no foreign reinsurance. However, in contrast to other economic ventures, insurance underwriting is highly volatile. In this situation, FDI inflows can support a fair sharing of risks among nations.

The communist era had a profound impact on every area of the economy, and the protracted shift from communism to capitalism necessitated extensive systemic changes. In the transition period of the early 1990s, each country had a distinct level of economic development and implemented various reforms that attracted varying degrees of FDI. The insurance markets in developing countries experience varying phases of development, and the overall amount of premiums collected is directly correlated with the overall state of those markets (Beck et al., 2000). Along with other financial services, the insurance industry has grown in significance since the mid-1980s as part of the overall growth of financial markets and institutions. In the belief that FDI would spur economic growth, most nations at this time substantially relaxed limits on FDI and actively offered tax advantages and subsidies to attract foreign capital (Javorcik, 2004). However, during the 1990s, the expansion of global trade, the liberalization of financial markets, and the growing influence of FDI have also contributed to the expansion of financial institutions' roles and the globalization of insurance services (Outreville, 2021).

Due to a dearth of data, no specific empirical study on FDI in the insurance services sector has been done, even though numerous studies have been done on FDI flows in general and the operations of foreign banks in transitioning nations. Many countries' policy makers are interested in the role that FDI plays in the growth process, and they are working to increase the competitiveness and productivity of their home industries by luring FDI in. By contrast, very limited research has looked at FDI's possible impact on the insurance services industry. Since the

insurance sector in these transitional European countries is still developing and building integration, FDI inflows are seen as essential to the countries' overall economic growth. In contrast, not much research has examined how FDI inflows might affect the insurance development. The FDI inflows are seen as crucial to the general economic growth of these emerging European countries because the insurance sector is still growing and integrating.

Life and non-life insurance businesses serve as important financial intermediaries that help secure long-term financial needs and enhance risk management. Deposit insurance and setting aside funds for unforeseen circumstances also boost the efficiency of other financial sectors, such as banking and the capital market. Despite sharing a common history, being in proximity, and belonging to the same region, these countries differ in terms of macroeconomic performances and how FDI affects them. In a sample of 18 European transition and post-transition nations, the life cycle hypothesis (LCH) was investigated (Ganić & Mamuti, 2020). The results shed light on the effects that lifestyle modifications and the gradual process of economic transformation have on European transition and post-transition nations. It also exposes a special and very fascinating relationship that shapes gross national savings between demographic patterns, transition processes, and economic advancement levels. Empirical research findings indicate that variations exist among the countries in the area regarding the influence of FDI on economic expansion (Mahmoodi & Mahmoodi, 2016; Simionescu, 2016). While much research has been done on FDI inflows into European transition countries, less research has been done on how these inflows affect the insurance industry in these countries.

This research paper aims to empirically investigate the existence of a positive relationship between FDI and insurance development, and to analyze whether this relationship differs among different groups of countries that differ in their level of development and degree of European economic integration. More precisely, the study investigates whether the increase in FDI leads to higher life and non-life insurance penetration in emerging Europe countries.

Finding a long-term link between FDI and insurance development is the first novel aspect of our research. Using a panel of emerging European countries with dynamic ordinary least squares (DOLS) analyses and Granger causality analysis, our work improves on the previous very limited research for European transition countries. The second novel suggests that the gross domestic product per capita may indicate weaker economic conditions and modest FDI inflows, which could be the cause of the relative underdevelopment of the insurance sector in transitioning nations. More specifically, the effect of FDI on insurance development is greater in the European post-transition countries with higher GDPPC and FDI inflows than in the European transition countries. The conditions for the further development of life and non-life insurance are better in countries under the study with comparatively higher GDP per capita and FDI inflows.

## **Literature Review**

The relationship between the financial sector and economic growth has been thoroughly examined in the literature on finance and growth, with frequently

contradictory findings in time-series or cross-sectional studies (Beck et al., 2000; Pradhan et al., 2015, 2017). The FDI flows into emerging Europe's countries are insufficient due to the poor quality of institutions in their own markets (Ganić, 2022). Evidence on the impact of FDI is varied, and macro-level analysis investigates whether countries that attract more FDI experience faster economic growth. Some empirical studies in transition countries confirm this positive relationship between FDI flows and growth (Asteriou et al., 2005; Ganić et al., 2016; Kinoshita & Campos, 2002; Nath, 2005), while other studies have failed a positive relationship (Carkovic & Levine, 2005; Lyroudi et al., 2004; Topxhiu & Radoniqi, 2018).

Finally, the banking literature has also investigated the link between FDI, financing, and development – the findings have been conflicting (Yerpude et al., 2022). The possible role of foreign FDI in the insurance services industry has not received much research compared to the banking industry. These studies, like the banking literature, examine the elements that lead to foreign corporations entering a nation or identify the best places for FDI.

According to economic theory and insurance literature, a host country's economic development can be facilitated by the free flow of insurance services across national borders, as it increases competition and improves the social welfare of the domestic market (Carris, 1990; Skipper, 1996; for example; Smith, 1970). However, there has been inconsistent application of this idea. There are plenty of studies that focus on the insurance sector and FDI separately. However, research that has investigated insurance-related aspects of FDI is quite limited. Because of this, some extremely interesting research on this issue has been discovered and presented below.

The factors affecting FDI in Germany, the United Kingdom and the US insurance industry are examined (Moshirian, 1997, 1999). His findings suggest that the growth of international insurance companies is influenced by both insurance premiums and the GDP of the host nation. Due to insufficient cross-sectional data, this research has up to now been restricted to time series analyses of specific nations. Furthermore, the real involvement of foreign insurance companies through FDI in these local markets has not been examined in these researches, which have typically concentrated on the financial resource investment. OECD countries with higher gross domestic product (GDP) and reduced trade barriers are more likely to attract more international insurance companies (Ma & Pope, 2003).

The size of the insurance market influences greater FDI in the insurance industry in source countries as well as the degree of financial development in host countries (Li & Moshirian, 2004). Additionally, studies indicate that FDI in the insurance industry is discouraged by the comparatively high cost of capital in host nations. In a panel analysis, one study examined the direct connection between FDI and the life insurance industry in 28 developing nations between 1992 and 2011 (Carson et al., 2014). The study also considers the significance of financial development and a country's specific factors, like governance and human capital. The findings show that countries that have greater FDI inflows typically have higher volumes of insurance services, particularly in the financial sector. However, the analytical model's inclusion of financial development determinants and country-specific variations reduces the significance of FDI.

Additionally, FDI inflows affected the uptake of non-life insurance in 76 developing nations between 1996 and 2011 (Sawadogo et al., 2018). Their research is predicated on two well-established concepts from the literature: FDI raises per capita income, and higher per capita income fosters the growth of insurance, especially non-life insurance. The authors claim that the influence of FDI inflows on the insurance industry extends beyond GDP per capita performance. In fact, FDI may result in a rise in the consumption of insurance services at a particular GDP per capita level.

Another study investigated the relationship between foreign capital insurance market, FDI, and economic growth in China (Wang & Li, 2019). Through the analysis of data from 1984 to 2015, they used tests such as the unit root test, least squares regression, and Granger causality test. Their findings showed that the development of the foreign capital insurance market in China did not contribute to economic growth in China, while FDI was found to have a positive impact on economic growth. They also noted that China's general economic growth encouraged the development of the foreign capital insurance market, although the insurance market channels were not efficient enough for foreign capital in China, emphasizing the applicability to China's domestic insurance market (Ansi et al., 2024; Novarlić & Đurić, 2024).

Carson et al. (2021) focused on the life insurance industry while building a panel of 29 rising emerging countries. The authors find that higher rates of life insurance penetration are also found in nations with larger levels of FDI, particularly in the banking sector.

Dragotă et al. (2023) explored the impact of new elements in the financial and economic environment on the demand for life insurance in 29 OECD member nations between 2005 and 2017. Regardless of the degree of old age dependency, their findings show that the development of the life insurance market accelerates in nations with high rates of FDI and high scores in investment flexibility. They also concluded that the demand for life insurance products is positively impacted by GDP per capita.

Research on the effect of FDI on the growth of the insurance sector in all transitioning European countries was lacking. Nevertheless, certain research that has considered many countries from that sample has generally demonstrated a strong correlation between FDI inflows and the growth of the insurance industry. For example, for the region of the Western Balkans, we found one study done recently (Berisha & Sopi, 2023). The authors used panel data analysis to examine the effects of FDI inflows into the insurance sector between 2004 and 2021. According to their analysis, the econometric model's behavior of three independent variables – the gross written premium, the insurance asset, and the penetration rate – indicate that FDI inflows have a favorable impact on the growth of the insurance industry.

## **Data and Methodology**

The study employs data sourced from the World Bank's Financial Development and Structure Dataset database for 14 emerging European countries between

1990 and 2021. The countries are divided into two groups: European transition countries (Albania, Bosnia and Herzegovina, North Macedonia, Moldova, Serbia, and Georgia) and European post-transition countries (Bulgaria, Croatia, Czech Republic, Hungary, Poland, Romania, Slovakia, and Slovenia). The degree of economic integration and economic development between these two groups of people varies. The European transition economies are less developed countries than those that have already passed the transition and belong to the newest members of the EU. The following variables are used in our research: the life insurance premium volume to GDP (%), the non-life insurance premium volume to GDP (%), GDP per capita (in constant 2015 dollars), and the inflows of FDI as a percentage of GDP. The availability of data on the observed variables was taken into consideration when choosing the countries for the study.

The long-term impacts of increased FDI on the insurance development are empirically explored in this research study, with a focus on life and non-life insurance in European transition and post-transition countries. To ascertain their long-term association, the analysis employs fully modified ordinary least squares (FMOLS) and dynamic ordinary least squares (DOLS) dynamic panel analysis. The DOLS estimator is normally distributed and asymptotically unbiased even in the presence of endogenous regressors. This indicates that the DOLS estimates tend to resemble the genuine model parameters and have a normal distribution under optimal conditions with large enough samples. Because endogeneity can skew the regression results, it is crucial that we account for the potential endogeneity of FDI flows through this feature.

The study estimates the following model:

$$LINS/NLINS_{it} = \beta_0 + \alpha_1 FDI_{it} + \alpha_2 LnGDPPC + \varepsilon_{it} \quad (1)$$

where  $\alpha$  stands for the parameters that need to be evaluated;  $\varepsilon$  indicates the model error term; and  $\beta$  is a constant. The dependent variables are: LINS measured by the life insurance premium volume to GDP (%) denotes life insurance penetration and NLINS measured by the life insurance premium volume to GDP (%) denotes non-life insurance penetration for country  $i$  during period  $t$ . FDI as a percentage of GDP represents an explanatory variable, and GDPPC denotes GDP per capita expressed in constant 2015 dollars (in logarithm form), as a control variable to examine the impact of insurance development independently of the income effect. To appreciate the effects of FDI inflows on the economy, it can be helpful to separate the effects of FDI from the effects of overall economic development. Therefore, we can more accurately evaluate the unique effects of FDI on development, independent of the overall state of the nation's economy, by including GDP per capita in the model (1).

Panel root analysis is used to investigate whether the variables are stationary at the start of the analysis. The panel cointegration technique is used to establish cointegration relationships between variables when non-stationarity has been determined.

The set of panel unit root tests is used to assess the stationarity of the employed variables. Because it assists in identifying erroneous correlations, this study is significant. To account for the various ways that trends could manifest themselves

and the seasonality of the data, the series is considered to have intercept as well as constant and trend. To guarantee accurate modeling and result interpretation, these tests enable researchers to ascertain whether a data series is stationary. Cointegration tests, such as the [Pedroni test \(1999, 2004\)](#), the Johansen test (1988, 1991), and the Kao test (1999), are methodologies used to reveal the existence of a long-term relationship among variables that have long-run characteristics. This method makes it possible to verify whether all the analysis's variables have a sustained link with one another.

Furthermore, estimations of cointegration equations include the application of the DOLS approach ([Kao & Chiang, 2000](#)). These methods are used with the aim of estimating or quantifying the long-term relationship between variables. The DOLS technique addresses endogeneity issues and eliminates serial correlation that occurs in the standard ordinary least squares (OLS) method. Furthermore, panel causality methods will be applied to analyze causality between selected variables in equation 1 ([Dumitrescu & Hurlin, 2012](#)).

## Empirical Results

[Table 1](#) provides information on the probabilities at the 0.05 significance level for testing the stationarity of the employed dependent and independent variables, both in the intercept and trend models and in the intercept models. The output presented in [Table 1](#) shows that the probabilities for those variables are greater than 0.05, which indicates the presence of unit roots for the variable LINS and GDPPC (Intercept and trend as well as Intercept). Since the null hypothesis implies the presence of unit roots, we consider the first-order differences of these variables. It is clearly visible that all employed variables are stationary after applying first-order differences, indicating their stationarity at  $I(1)$ .

As shown in [Table 1](#), the unit root test output satisfies the requirements needed for cointegration analysis. We first perform a cointegration test to make sure the employed variables are stationary after applying the proper transformations, and then we investigate any potential long-term relationships between them. Then, we can determine whether there are long-term linkages between variables and whether there may be long-term equilibrium links between them by using the cointegration test. The understanding of the long-term impact interplays between FDI inflows and other economic variables encompassed in the study is contingent upon this examination. Once the variables had reached stationarity, we methodically examined the cointegration of FDI, LINS, NLINS, and Log of GDP per capita (LNGDPPC). First, the [Pedroni test \(1999, 2004\)](#) was used to determine whether the variables showed signs of cointegration. [Table 2](#) presents a summary of estimates of Pedroni's residual cointegration tests. The null hypothesis of no cointegration for the most of models can be rejected because most of the statistical tests (Group Phillips–Perron (PP)-Statistic, Group Augmented Dickey-Fuller (ADF)-Statistic, Panel PP-Statistic, and Panel ADF-Statistic) revealed statistical significance. In fact, the variables are cointegrated at statistically significant levels.

As indicated in [Table 3](#), the Kao panel cointegration test results for each model coincide with the Pedroni's panel cointegration test findings. In other words, these

Table 1. Stationarity Tests.

Variables	Intercept and Trend							
	I(0)				I(1) First difference			
	ADF – Fisher	PP – Fisher	Levin, Lin, and Chu (LLC)	Im, Pesaran, and Shin (IPS)	ADF – Fisher	PP – Fisher	LLC	IPS
FDI	41.79**	57.44***	-2.51***	-2.47***	127.20**	81.43***	-7.42***	-9.34***
LINS	27.09	44.05**	-0.45	0.23	68.11***	262.17***	-2.14**	-4.41***
NLINS	43.37**	42.12**	-1.81**	-2.05**	86.00***	139.17***	-5.42***	-6.15***
LnGDPPC	23.82	282.35***	2.69	0.20	87.65***	387.22***	-5.05***	-6.28***

  

Intercept								
	I(0)				I(1) First difference			
	ADF – Fisher	PP – Fisher	LLC	IPS	ADF – Fisher	PP – Fisher	LLC	IPS
FDI	59.00***	83.57***	-3.12***	-4.04***	167.50***	308.01***	-8.62***	-11.54***
LINS	30.12	61.40***	-1.59*	-0.74	74.38***	188.32***	-3.08***	-4.94***
NLINS	49.19***	50.43***	-2.71***	-2.29**	114.72***	177.92***	-7.45***	-8.10***
LnGDPPC	8.86	33.22	-1.45*	2.86	111.43***	178.76***	-6.16***	-7.92***

Source: Authors' calculations.

Note: \*, \*\*, \*\*\* means significance of the tested variables at 10%, 5%, 1% levels. Standard errors are in brackets.