CORVINUS UNIVERSITY OF BUDAPEST

The Effect of China's Outward Foreign Direct Investment on the Economic Growth of the Visegrád Group

DOCTORAL DISSERTATION

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Table of Contents

List of tables

List of figures

List of Abbreviations

ASEAN - Association of Southeast Asian Nations

CEE - Central and Eastern Europe

CS-ARDL - Cross-Sectional Autoregressive Distributed Lag

DUIHK - German-Hungarian Chamber of Industry and Commence

ECA - Europe and Central Asia

EQM - Equity Market Size

EU - European Union

FDI - Foreign Direct Investment

FGLS - Feasible Generalized Least Squares

FRED - Federal Res

GDP - Gross Domestic Product

GMM - Generalized Method of Moment

HIPA - Hungarian Investment Promotion Agency

IMF - International Monetary Fund

MSDR - Markov Switching Dynamic Regression

OECD - Organisation for Economic Co-operation and Development

OFDI - Outward Foreign Direct Investment

OLS - Ordinary Least Squares

PCA - Principal Component Analysis

PCI - Productive Capacities Index

PR - Proportional Representation

UNCTAD - United Nations Conference on Trade and Development

V4 - Visegrád group – the Czech Republic, Hungary, Poland, Slovakia

VEC - Vector Error-Correction

TEN-T - Trans-European Transport Network

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Chapter 1. INTRODUCTION

1.1 Research background

In the era of globalization and interconnected economies, Foreign Direct Investment (FDI) has emerged as a vital catalyst for economic growth and development. With the ascendance of China as a global economic powerhouse and a significant source of outbound FDI, the effects of Chinese investment on recipient countries have become a subject of substantial interest and investigation. Visegrád Group (V4) has become an important role after joining the European Union (EU) in 2004. In this context, examining the empirical relationship between China's OFDI and the economic growth of the Visegrád Group holds significant importance.

China has become the second largest economy in the world. It opened its economy to the world through the reform and open-up policy proposed by Deng Xiaoping in 1970s and got engaged in overseas investment through the 'going global' policy in 2000. China aimed to engage in the foreign market and has become an FDI-exporting country in the world (Cai, 1999). The Chinese government encouraged domestic companies to look for investment opportunities outside of China and improve their competitiveness (Szunomár, 2016). When China became a member of the World Trade Organization (WTO), it was a milestone of opening and going global.

China's rapid economic expansion and its strategic initiatives, such as the Belt and Road Initiative (BRI)[1], have propelled it to the forefront of the global investment landscape (OECD, 2018). China's OFDI in the V4 countries has primarily focused on strategic sectors such as energy, infrastructure, manufacturing, telecommunication, and technology. This rise has prompted scholars, policymakers, and economists to explore the multifaceted impacts of China's OFDI on recipient economies, particularly in regions where economic dynamics are in transition. The V4 countries are participating economies in the BRI and form part of the New Eurasian Land Bridge known as the New Silk Road (NSR). The NSR is a concept and initiative that focuses on enhancing transportation and connectivity between Europe and Asia. It is a

[1] Belt and Road Initiative connects Asia, Africa, and Europe through two different ways: land and maritime, which is along the six corridors, aiming at improving regional integration, increasing trade and investment, and strengthening economic growth.

modern iteration of historical trade routes that facilitated the exchange of goods, culture, and ideas between these two continents. Further among more than 60 BRI countries, 16 Central and Eastern European (CEE) countries and China set up the "16+1" framework[2], aiming at the promotion of business and investment relations. The "16+1" format was founded in Budapest in 2012. V4 as part of the CEE countries has actively held the summit in Warsaw, Poland in 2012 and in Budapest, Hungary in 2017 with the theme of "Deepen economic, innovation, financial cooperation and promote mutually beneficial and win-win development". The CEE countries, including V4 provide incentives for inward FDI via tax concession, tariff-abolition, free economic zones, and double taxation avoidance (Ebbers and Zhang, 2010). Located in the centre of Europe, V4 is a window opportunity for China to access to Western European market easily. The relative low-cost but skilled labour force is also attracting Chinese investors. Besides, V4 is having high trade openness, good infrastructure, and political stability. Therefore, V4 has been a significant target market for China in the CEE and the EU.

The V4 countries, once part of the Eastern Bloc, have undergone remarkable transformations since the collapse of the Soviet Union (Heydemann and Vodicka, 2017). They have successfully transitioned to market-oriented economies and joined the European Union (EU), embracing liberalization, privatization, and economic reforms. As they continue their paths of growth, the increasing presence of China's OFDI raises questions about how this investment interacts with their economic trajectories. The EU eastern enlargement extends an opportunity for China to expand its market to the newly joined EU countries. The EU debt crisis deepened economic divergence and led to the EU centrifugal (Saraceno, 2015). The national self-interest drives Central and Eastern European countries, including V4, to look for investments outside of the EU. China's investments helped companies that were suffering from 2008 financial crisis (Szunomár, 2014; Meunier, 2014). China invests in V4 countries both by state-owned and private enterprises with mainly M&A and greenfield investment (Szunomár, Völgyi & Matura, 2014). Chinese company Wanhua Group acquired the Hungarian isocyanates producer BorsodChem in 2011 when the financial crisis hit the company badly. The acquisition brought around USD 150 million from Wanhua and saved jobs of 2700 people (ICIS Explore, 2022).

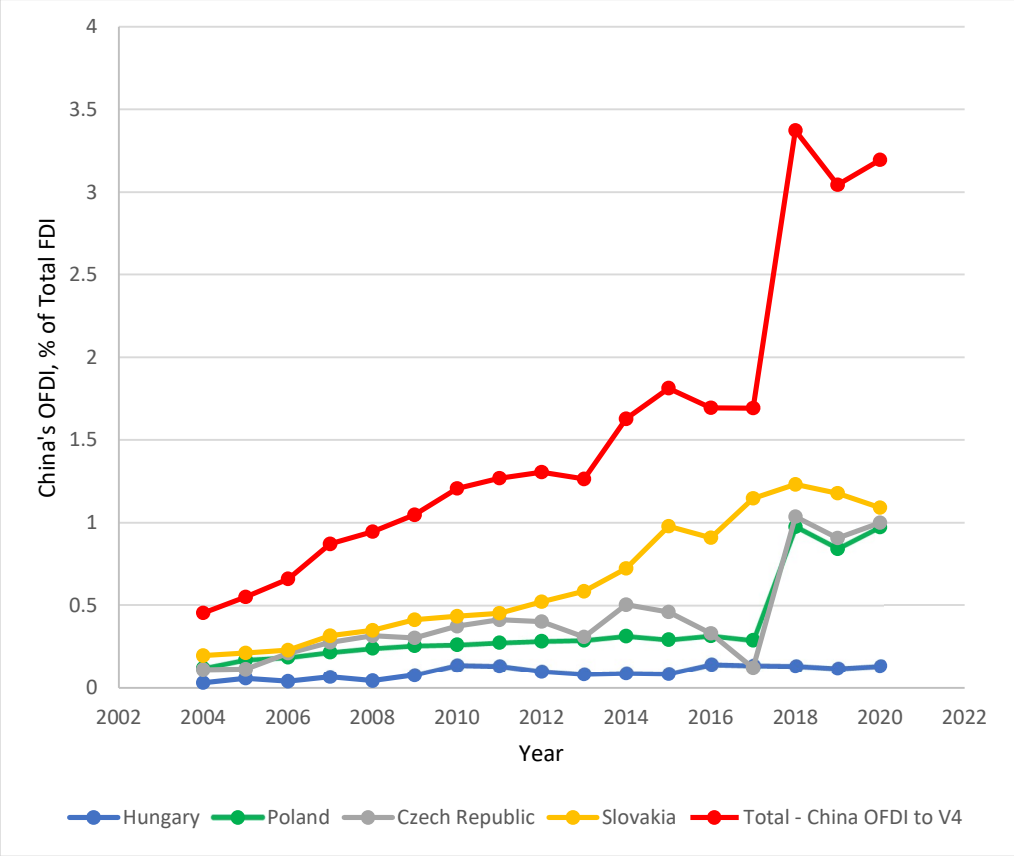
[2] "16+1" framework: it is an initiative proposed by Chinese Ministry of Affairs to expand economic and business cooperation between China and 16 Central and Eastern European countries, namely, Albania, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Hungary, Montenegro, North Macedonia, Poland, Romania, Serbia, Slovakia, Slovenia, Estonia, Latvia, and Lithuania. In 2019, it became "17+1" when Greece joined, and it became "14+1" from 2022 due to the withdrawal of Estonia, Latvia, and Lithuania.

The leading Polish waste treatment company NOVAGO was acquired by China Everbright International in 2016, with approximately USD 130 million (China Everbright environment Group, 2016). The rail connectivity has been realised between China and Slovakia. In 2017, there are two cargo-trains from China to Slovakia: the first one is from a northeast city Dalian to Bratislava; the second train is from my hometown Xi'an to Dunajska Streda in Southern Slovakia. The transportation connectivity is enhancing the China's investment in Slovakia. The Clean Energy Finance Corporation (CEFC) China Energy acquired Czech steel producer ZDAS in 2016 and build the second headquarter in Czech Republic.

Previous research on the impact of FDI on economic growth has established theoretical frameworks that suggest positive relationships (Djankov & Hoekman, 2000; Campos & Kinoshita, 2002; Meunier, 2014). Foreign capital infusion can lead to technology transfer, knowledge spill overs, improved productivity, job creation, and enhanced trade relationships. However, the specific impacts of China's OFDI within the unique context of the V4 countries remain understudied, requiring an empirical investigation (Dubravčíková et al., 2019).

Figure 1 depicts that China's OFDI as a percentage of total FDI in the V4 countries has been on the rise from 2004 to 2020. China's OFDI stock in V4 has reached to USD 5.5 billion in 2020, with USD 3350 million the most in Hungary (OECD, 2023). This development encourages research into the importance and effectiveness of China's investments. Considering regional developments in the V4 countries, this research estimates whether China's OFDI contributes to V4's economic growth during the sample period of 2004 to 2020. The research conducts the research from 2004 as the starting timeline because a visible number of investments flew to the V4 from this year when the V4 joined the EU.

Figure 1. China's OFDI in the V4 countries, 2004-2020



Source: Author's construction. Data from OECD

This empirical research seeks to build upon the existing body of knowledge by providing quantitative evidence of the effects of China's OFDI on the economic growth of the V4 countries. By employing robust econometric techniques and analysing extensive datasets, this study aims to quantify the relationships between China's OFDI and the real GDP growth of V4.

It is essential to acknowledge the potential heterogeneity in the effects of China's OFDI across the V4 countries, considering their differing economic structures, industrial compositions, and levels of integration with global markets. Moreover, exploring the mediating mechanisms

through which China's OFDI influences economic growth, such as productive capacities, provides a nuanced understanding of the channels through which these effects manifest.

The findings of this empirical research have implications for policymakers, economists, and investors alike. A comprehensive understanding of the empirical relationship between China's OFDI and the economic growth of the V4 countries can guide policy formulation, enhance investment strategies, and contribute to informed decision-making. By empirically substantiating the effects of China's OFDI, this research aims to provide insights that contribute to the ongoing discourse on global investment trends and their impacts on emerging and transitional economies.

1.2 Problem statement

In the contemporary landscape of global economics, a pressing empirical research problem revolves around the quantifiable effect of China's OFDI on the economic growth of the V4 countries. This research seeks to empirically investigate the extent to which China's OFDI impacts the economic growth trajectories of these Central European nations, shedding light on the specific causal relationships, magnitudes, and dynamics that shape this intricate phenomenon. Amidst the evolving global economic order, understanding the empirical links between China's OFDI and economic growth in the V4 countries is of paramount importance. The research problems are defined by the following core questions:

- Causal relationship: To what degree does Chinese FDI causally contribute to the economic growth of the V4 countries? Is there empirical evidence of a direct positive association between increasing China's FDI inflows and higher rates of economic expansion?
- Quantifying growth effects: What is the quantifiable impact of Chinese FDI on key economic growth indicators, such as real GDP growth in the V4 countries? Can these effects be measured statistically and substantiated with empirical data?
- Mediating mechanisms: What are the mediating mechanisms through which China's OFDI exerts its effects on economic growth in the V4 countries? Are these effects primarily driven by technology transfer, increased exports, enhanced productivity, or other factors?
- Policy implications: What policy implications can be drawn from the empirical findings regarding the impact of China's OFDI on economic growth in the V4 countries? How can

policymakers leverage these insights to optimize the benefits of Chinese investment while addressing potential challenges?

By conducting a rigorous empirical investigation, this research aims to contribute empirical evidence that can inform policymakers, economists, and stakeholders about the specific mechanisms through which China's OFDI interacts with economic growth in the V4 countries. Through statistical analysis and data-driven insights, this research seeks to provide a comprehensive understanding of the quantitative relationships and empirical realities that define this complex interplay between foreign investment and economic growth.

1.3 Motivation

China's rapid economic rise has transformed it into a key global player, not only in terms of trade but also as a significant source of FDI. China's rapid economic growth, increasing technological prowess, and strategic global initiatives, such as the Belt and Road Initiative (BRI), have positioned it as a significant source of FDI for numerous countries. One area that warrants thorough investigation is the impact of China's FDI on the economies of the Visegrád 4 countries. This phenomenon has sparked interest in understanding the potential effect of China's OFDI on the economic growth of recipient countries. In this context, conducting empirical research on the effect of China's OFDI on the economic growth of the Visegrád 4 countries holds great significance. Several compelling reasons that underscore the importance of this research are:

- Unprecedented shift in investment flows: China's ascension to become a major global investor signifies a significant shift in the patterns of FDI flows. Investigating how China's OFDI influences economic growth in the V4 countries can provide insights into the changing dynamics of international investment and its consequences for recipient economies.

- V4 economic growth patterns: While the V4 countries have experienced impressive economic growth since their transition to market economies, exploring the role of China's OFDI can offer a nuanced understanding of the factors driving growth. This research can help discern whether Chinese investment acts as a catalyst or complements existing growth drivers.

- Trade-related dynamics: China's FDI could potentially influence trade patterns between the V4 countries and China. Empirical analysis can shed light on whether increased FDI corresponds with expanded trade relationships, contributing to economic growth by boosting exports and import demands.

- Technology transfer and innovation: An empirical investigation can provide insights into the extent of technology transfer resulting from Chinese OFDI. Understanding whether technology spill overs occur and whether these contribute to local innovation can have implications for the long-term economic competitiveness of the V4 countries.

- Sustainability and dependency concerns: Assessing the effects of China's OFDI on the economic growth of the V4 countries is critical to identifying potential sustainability issues and dependencies that might emerge due to increasing reliance on Chinese investment. These insights can guide policymakers in balancing economic growth with strategic autonomy.

- Policy formulation: Findings from empirical research can directly inform policy formulation at both national and regional levels. Policymakers can tailor strategies to attract beneficial FDI, leverage potential positive effects, and mitigate negative consequences, thereby optimizing the economic impact of Chinese investment.

- Broader geopolitical implications: The empirical examination of China's OFDI impact extends beyond economics, as it can provide insights into the geopolitical strategies underlying China's investment decisions. Understanding whether these investments align with broader regional ambitions and influence diplomatic relationships is crucial for a holistic perspective.

- Contribution to scholarly literature: Empirical research on the effect of China's FDI on V4 countries' economic growth can contribute to the scholarly literature by advancing our understanding of the complex relationships between FDI, economic growth, and international economic dynamics.

By conducting empirical research on the impact of China's OFDI on the economic growth of the V4 countries, scholars, policymakers, and stakeholders can gain a deeper comprehension of the nuanced effects of this investment trend. This research has the potential to provide

actionable insights that support informed decision-making, enhance economic cooperation, and foster balanced development in both the V4 countries and their interactions with China.

1.4 Research objectives

The objective of this research is to provide a comprehensive understanding of the relationship between China's OFDI and economic growth of the V4 countries. This study aims to address the following research questions:

- Is there a correlation between China's OFDI and economic growth of the V4 countries?
- Is there a causal relationship of China's OFDI on the V4's economic growth from a sample of four heterogenous countries?
- What factors, for example, productive capacities, are significant in the efficacy of China's OFDI on the V4's economic growth?
- Is there a short-run and long-run effect of China's OFDI on V4's economic growth?

These questions need answers and may have economic policy implications that lead the research to pursue the following research objectives:

- Provide a comprehensive review of the FDIs and economic growth and contribute to the knowledge gap about China's OFDI and V4 economic growth with reference to the variables, sample size, methodologies, and findings.
- Provide new empirical knowledge about the moderating effect of productive capacities in the China's OFDI and V4's economic growth nexus.
- Provide the efficacy of China's OFDI on economic growth of the V4 countries using Panel Data models, with more emphasis on the Random Effects model.
- Provide a composite measure of China's OFDI and its effect on different levels of economic growth of the V4 countries using Principal Component Analysis and Quantile Regressions.
- Provide the efficacy of China's OFDI on economic growth in the short and long run for each of the V4 countries using the Cross-Sectional Autoregressive Dynamic Lag model.
- Provide the efficacy of China's OFDI on economic growth of the V4 countries by capturing transitions between different states of economic growth.
- Deploy recent long-run data from 2004 to 2020 to capture recent developments in China's OFDI to the V4 countries and provide a comparative analysis.

1.5 Novelty of the research

The novelty of the dissertation includes 2 parts. Firstly, empirical estimations of the effect of China's OFDI on V4's economic growth is filling the gap of lacking empirical analysis on this topic. Literature in this field shows many research studied economic cooperation between China and V4, the motivations of China's OFDI in V4, and more broadly, Chinese investment in Central and Eastern Europe (Chen, 2012; Liu, 2013; Szunomár, 2014; Szunomár & Biedermann, 2014; Matura, 2014; Fan, 2014; Jacoby, 2014; Meunier, 2014; Deng, 2014; Kong, 2015; Chen, 2016; Góralczyk , 2017; Matura, 2017; McCaleb & Szunomár, 2017; Fürst, 2017; Liu, 2017; Jacimovic et al, 2018; Shi & Heiduk, 2019; Moldicz, 2020; Turcsányi, 2020; Ramasamy & Yeung, 2020; Matura, 2021; Karásková, 2021; Moldicz, 2021; Szunomár, 2022). However, it's barely found studies that apply quantitative methods to this topic.

China's OFDI affects V4's economic growth and there are several moderating factors that enable this relationship. The international institutions and researchers stressed the importance of strengthening productive capacity and argued that developing productive capacity would contribute to economic performance (Andreoni, 2012; Freire, 2011; Gnangnon, 2021). I believe China's OFDI affects the V4's economic growth through productive capacities. Thus, the second novelty is that I create an interaction between China's OFDI and the Productive Capacities Index (PCI). The idea of this research is that an increase in productive capacities have positive effects on both foreign direct investment and gross domestic product. It follows the hypothesis that PCI positively and significantly moderates China's OFDI and V4's economic growth nexus and that PCI has a significant and positive effect on V4's economic growth. This hypothesis has not been tested empirically in the V4 countries by scholars. Hence, the dissertation makes a significant contribution to the study of China's OFDI and V4's economic growth nexus which is aligned with the literature of productive capacities, FDIs, and economic growth.

Foreign investors are more likely to invest in countries with higher productive capacity. When a country has ability to produce goods and services efficiently and effectively, it becomes an attractive destination for FDI. Investors seek opportunities where they can utilize existing infrastructure, skilled labour, advanced technology, and reliable supply chains to maximize their returns on investment. Increased productive capacity signals a favourable business environment, leading to higher FDI inflows. For example, Hong and Kim (2003) finds that

Korea prefers to invest in European countries that have a large market. The V4 countries are countries connected to the European Union single market and this is attractive for foreign investors. Nayyar (2008) finds that the location advantages for India firms arise from market opportunities, cheaper inputs, and trade barriers in host countries. In addition, Yu et. (2019) finds that Chinese firms, in the Belt and Road Initiative (BRI), that are responsive to invest in foreign countries consider productive capacity factors in the host countries. They also find that the BRI positively affect China's Outward FDI. When a country enhances its productive capacity, it can meet a higher level of domestic demand for goods and services. This expanded that market potential can make the country more attractive to foreign investors. FDI inflows increase as investors seek to tap into the growing consumer base and take advantage of increased sales opportunities. A country with improved productive capacity can often offer cost advantages in terms of labour, infrastructure, or access to resources (Siddharthan and Narayanan, 2020). This cost efficiency appeals to foreign investors who seek to minimize production costs and maximize their profitability. By investing in countries with increased productive capacity, foreign investors can benefit from economies of scale, lower production costs, and improved competitiveness in global markets (Desai et al., 2005). Productive capacity expansion often involves investments in infrastructure, such as transportation networks, energy facilities, and communication systems. Improved infrastructure can significantly reduce logistical challenges and costs for businesses, making the country more appealing to foreign investors. Efficient infrastructure facilitates the smooth operation of businesses, enhances connectivity, and streamlines supply chains, all of which can attract FDI. Increasing productive capacity often involves investing in human capital development, including education and training programs (Moudatsou, 2003). By improving the skills of the local workforce, a country can offer a skilled labour pool to foreign investors. This can be a crucial factor for FDI inflows, as investors are more likely to establish operations in countries where they can find a skilled workforce to meet their production needs. Expanding productive capacity often involves adopting advanced technologies and promoting innovation. Countries that invest in research and development, technology transfer, and innovation ecosystems become attractive destinations for foreign investors (De Mello, 1999). These investors seek opportunities to access the latest technologies, collaborate with local research institutions, and leverage innovation-driven growth. By fostering a supportive environment for technology and innovation, a country can attract FDI from companies looking to benefit from these advancements. When productive capacity increases, it implies that the economy can produce more output, which has a positive impact on GDP. An expansion in productive capacity enables an economy to meet growing

demand, both domestically and internationally, resulting in increased production, sales, and revenue. This leads to higher GDP as more goods and services are produced and sold, generating economic growth. Additionally, an increase in productive capacity can have multiplier effects on the economy. Cornia (2021) finds that productive capacity does not only stimulate economic growth but also reduce growth volatility. It creates employment opportunities, stimulates income growth, and enhances overall economic activity. These factors further contribute to GDP growth.

This study finds that most scientific scholars utilize PCI variables partially. Therefore, I combine these variables and adopt the PCI mathematically constructed by the UNCTAD (2021). The PCI is divided into 8 categories: Human capital, Natural capital, Energy, Transport, Information and Communication Technology, Institutions, Private sector, and Structural change.

Human capital captures the education, skills and health conditions possessed by population, and the overall research and development integration in the texture of society through the number of researchers and expenditure on research activities. The gender dimension is reflected by the fertility rate which at each increase reduces human capital score (UNCTAD, 2021).

Natural capital estimates the availability of extractive and agricultural resources, including rents generated from the extraction of the natural resource, less the cost of extracting the resource. To capture commodity dependence, natural capital decreases as the material intensity increases (UNCTAD, 2021).

Energy measures the availability, sustainability, and efficiency of power sources. For this reason, it is composed by use and access to energy, losses in distribution and renewability of energy components and sources, and includes the GDP generated by each unit of oil to highlight further the importance of optimal energy systems (UNCTAD, 2021).

Transport measures the capability of a system to take people or goods from one place to another. It is defined as the capillarity of roads and railway network and air connectivity (UNCTAD, 2021).

Information and Communication Technology estimates the accessibility and integration of communication systems within the population. It includes fixed line and mobile phones users, internet accessibility and server security (UNCTAD, 2021).

Institutions aim at measuring political stability and efficiency through its regulatory quality, effectiveness, success in fighting criminality, corruption and terrorism, and safeguard of citizens' freedom of expression and association (UNCTAD, 2021).

Private sector is defined by the "ease of cross-border trade, which includes time and monetary costs to export and import, and the support to business in terms of domestic credit, velocity of contract enforcement and time required to start a business" (UNCTAD, 2021).

Structural change refers to "the movement of labour and other productive resources from low-productivity to high-productivity economic activities. This shift is currently captured by the sophistication and variety of exports, the intensity of fixed capital and the weight of industry and services on total GDP. Structural change can also happen within a given sector provided that binding constraints in a particular sector are identified and effectively addressed" (UNCTAD, 2021).

The PCI is formulated as a composite index with 46 indicators. Once the data is collected and aggregated, it is assigned appropriate weights to each indicator which is crucial in reflecting their relative importance in the overall PCI. Additionally, normalization techniques are applied to standardize the values of individual indicators, ensuring comparability, and facilitating the aggregation process. Once the productive capacity index is calculated, it is interpreted and analysed to gain insights into the strengths and weaknesses of an economy. According to the UNCTAD (2021), the PCI index can be described by ***Equation 1***.

$$PCI = \sqrt[N]{\pi_{i=1}^{N} X_i^{PCA}} \quad (1)$$

, where N is the total number of categories and X_i^{PCA} is the weighted category score extracted using the principal component analysis (PCA) of category i. PCI scores range between 0 and 100.

1.6 Significance of the research

This research is written at a time when China's OFDIs in the V4 countries have exemplified a gradual growth with increased trade and the development of the Belt and Road Initiative. There is limited empirical research about the efficacy of China's investments in the V4 countries and this research certainly contributes to this aspect. China's outward investments are dynamic and influenced by conditions in host countries. This study provides how China's investments are attracted by and respond to the dynamics in the V4 region. And it empirically provides what leads to the increase in China's OFDI in the V4 region.

This study provides a rich study by incorporating a mix of empirical methods that explain various trajectories of the China's OFDI and economic growth nexus of the V4. The use of these methods sheds light on the comprehensive analysis of the nexus and adds value to the FDIs and economic growth literature. The research provides supplementary evidence of the inward FDI effect of other countries, namely, Germany, USA, and the World. The comparative analysis contributes that the effect of FDIs on economic growth of the V4 countries is positive and significant.

The novel contribution of the study is that China's OFDIs are attracted by productive capacities in the V4 countries. The findings of this study finds that productive capacities are significant in explaining the FDI and economic growth nexus. The study contributes to policy opportunities that productive capacities contribute more to FDI-growth nexus in the long-run than in the short-run. This shed light into that the economic relations between China and the V4 countries should be of a long horizon, and the V4 countries should invest more in productive capacities to attract FDIs. This means that future research should take productive capacities into consideration when estimating the effect of FDIs on real GDP growth. The study also contributes to the sensitivity analysis of economic growth in its different states. The findings of the research provide opportunities for the development of policies in the V4 countries that can further attract China' investments.

1.7 Structure of the research

This study consists of five (5) parts. *Chapter 1* introduces the research background, problem statement, motivations, research objectives, novelty of the research, significance of the

research, and structure of the research. *Chapter 2* provides FDI and economic growth theories as the foundation and the broad overview of the relationship between FDI and economic growth. *Chapter 3* introduces the methodology, including research design, data collection, description, and justification of each variable, providing the theoretical framework and empirical framework. *Chapter 4* provides the findings of the empirical analysis of China's OFDI on V4's economic growth and provides post-estimations where necessary. *Chapter 5* concludes the dissertation with the overview, main findings, contributions to the existing literature, policy recommendations, limitations of this research, and future research.

Chapter 2. LITERATURE REVIEW

2.1 Conceptualisation of foreign direct investment

The investment allows people to deploy capital to business projects or activities in order to generate positive returns. The restricted capital flows in the domestic country can limit the rate of return. Given this circumstance, international capital transfer achieves the free flow of capital beyond countries, which contributes to diversifying investments and looking for more opportunities. Three ways can be realized to manage capital across countries: foreign direct investment (FDI), foreign portfolio investment (FPI), and loans. This research is going to focus only on FDI as an explanatory variable. FDI is an important component of the international economy and a driving force of economic development.

According to World Bank, foreign direct investment (FDI) refers to direct investment equity flows in the reporting economy. It is the sum of equity capital, reinvestment of earnings, and other capital. Direct investment is a category of cross-border investment associated with a resident in one economy having control or a significant degree of influence on the management of an enterprise that is resident in another economy.

There are business opportunities and profits for the direct investors to keep stable and long-term economic relationships with the direct investment enterprises. This relationship is also based on the significant influence that investors can control the management of cross-border investments. Based on OECD's concept, the foreign direct investors can be an individual, a group of related individuals, an incorporated or unincorporated enterprise, a public or private enterprise, a group of related enterprises, a government body, an estate, trust or other societal organization, or any combination of the above, foreign direct investment enterprise refers to a resident enterprise in one economy in which the investor in another economy owns 10% or more voting power of the incorporated or the equivalent of an unincorporated enterprise.

FDI inflow is the capital received by a foreign investor, while FDI outflow is the capital flowing to a foreign country/economy from the home country. FDI can be categorized by greenfield, mergers and acquisitions (M&A) in manufacturing, assembly, services, etc. Each type of FDI can bring and create benefits to the economic development and welfare of the host country

(Moran, 1998). However, greenfield and M&A have distinctive differences (Raff et al., 2009). Greenfield investment enables one enterprise to build up a physical new plant or create a new facility in the host country, which can provide capital stock and employment opportunities (Ha et al., 2021). M&A refers to purchasing the assets of existing local businesses, and a merger with or an acquisition of a domestic firm would be a less source of trade effects and new jobs (Green & Meyer, 1997).

The patterns of FDI are shaped by the host country's economic development and geographic location (Zheng, 2013). Market-seeking FDI is attracted by the fast-growing and unsaturated market of the host country, efficiency-seeking FDI can be attracted by the low cost of production, economies of specialization and competitiveness, and resource-seeking FDI can be attracted by cheap labour, raw material, and infrastructure (Wadhwa & Reddy, 2011). Natural resources endowment and institutional quality stimulate agricultural and manufacturing FDI instead of services FDI (Doytch & Ere, 2012). Comparative advantages in unskilled labour-intensive industries and an increase in market size in the host country attract inward FDI (Waldkirch, 2011). Developing countries, emerging economies, and transition economies are the targets to which FDI flows. They usually have low saving rates, so foreign capital constitutes a vital financial source for them. Given these circumstances, FDI is a longer-duration financial flow and contributes non-tangible assets such as know-how, advanced technologies, and positive spill over effects to domestic firms (Baliamoune-Lutz, 2004). There are some prerequisites for a country or a company to do foreign investment in another country. Cultural distance, labour endowment, and trade agreements can be the factors that affect the home country's investment in other countries (Blonigen & Piger, 2014). The home country also takes into consideration of factors such as physical infrastructure, financial stability, income level, and liberalized trading arrangements (Barry & Bradley, 1997). Human capital is playing an important role in attracting FDI. Developing countries should enhance and expand education and increase the supply of skilled labour. The research studied by Lokesha & Leelavathy (2012) about the case of India shows good quality and productive human resources on the supply side and market size on the demand side matter a lot in attracting inflow FDI. The cost competitiveness and the economic stability of the country, and the degree of integration with the world economy have become important as well. Stable exchange rates and good monetary policies contribute to lower country risks, which consist of attractive determinants for the host country to invest (Baliamoune-Lutz, 2004). Besides, transparency and well-defined property rights create more opportunities for FDI. Firms will face the challenge of cultural barriers and

distances when crossing the border and expanding internationally. The prior FDI experience on the performance has a consistent and significant beneficial effect on the subsequent FDI performance (Delios & Beamish, 2001). The locational learning effect allows firms to obtain success of a later expansion from an earlier entry in the same country, while the previous experience also benefits a firm when expanding in other countries due to common cultural characteristics learning, supranational networks, etc. (Barkema, 1996). If the home country and host country share a similar culture, the subsequent FDI will benefit from the prior double proximate experience, and the home-proximate experience will be valuable to the subsequent FDI if dissimilar culture is shared (Zeng et al., 2013). Lu et al. (2014) found that besides the prior entry accumulate experiences in a particular country, government support from the home country and well-established institutions in the host country are highly significant as well. Besides, many governments from host countries also implement various policies and provide incentives to become more attractive to foreign investors. To implement the most effective policy, there are some differences between developing countries and developed countries. Goodspeed et al. (2011) indicated the FDI stock is sensitive to taxation in developed countries but not in developing countries. In both developing and developed countries, governance measures, infrastructure quality, and corruption in the host country can affect the FDI. Therefore, developed countries should put the taxation regime in the first place, and developing countries should put more effort into a government institutions and public infrastructure. However, the government should be cautious about the reason for FDI when adopting policies accordingly because different reasons cause different effects. Mukherjee & Broll (2007) examined when trade cost saving is the reason for FDI, FDI is beneficial for both the host country's consumers and producers; when FDI is to signal the cost of foreign firms, it does benefit the host country's producers but worse off the benefit of consumers. Many developing countries and transition economies promote economic liberalization policies to attract FDI, imports, and licensing of foreign technology and know-how in order to have more competition in their domestic market (Sinha, 2010). However, Eregha (2015) found that FDI inflow can substitute for domestic investment, and the FDI inflow has a significantly negative influence on domestic investment. The FDI volatility can also impede domestic investment. The political and economic union, European Union, is becoming a key FDI determinant due to the membership benefit. Dorakh (2020) focused on the new EU member states and investigated specific factors in FDI. The results reveal that EU membership exerts a positive and significant effect on FDI. The old EU members have become the main foreign direct investors in new EU member states, with fewer investors from non-EU countries.

2.2 Theories of foreign direct investment

FDI theories help us understand various aspects and factors that influence foreign direct investment (FDI) flows. They provide frameworks and insights into the motivations, determinants, and consequences of FDI. The theories shed light on the motivations behind companies' decisions to invest abroad. These motivations can include seeking market, accessing strategic assets or resources, reducing costs, diversifying operations, or leveraging technology and knowledge. The theories explain why companies choose specific countries or regions as their investment destinations. Factors such as market size, growth prospects, natural resources, labour costs and skills, infrastructure, political stability, legal framework, and institutional quality are considered in understanding location choices. The theories examine the impact of FDI on host countries. They help us understand the potential benefits and drawbacks of FDI in host economies, such as technology transfer, job creation, productivity growth, knowledge spill overs, tax revenues, and potential risks like crowding out domestic firms or exploitation of resources. FDI theories provide insights into the design and evaluation of policies related to FDI. They help policymakers understand how different factors, such as investment promotion measures, taxation policies, trade openness, intellectual property rights protection, and institutional reforms, can influence FDI inflows and maximize the benefits of FDI in the host economy. The FDI theories included in this study are the capital market theory, product life cycle theory, internationalization theory, industrial organization theory, entry mode theory, investment development path theory, and the eclectic paradigm.

2.2.1 Capital Market Theory

Capital Market Theory is an economic theory that explains the relationship between capital markets and the flow of foreign direct investment. The theory suggests that FDI is influenced by the availability and cost of capital in different markets. According to the Capital Market Theory, investors seek to maximize their returns on investment by allocating their capital to markets with the highest expected returns and the lowest risk (Ragazzi, 1973). In the context of FDI, this theory posits that investors will direct their capital towards countries or regions where they expect to earn higher returns on their investment compared to their home market. The theory emphasizes the role of capital market integration in driving FDI flows. When capital

markets are integrated globally, investors can allocate their capital across borders, seeking out the most attractive investment opportunities. The theory provides a comprehensive framework for understanding the relationship between capital markets and FDI. It considers factors such as expected returns, risk, cost of capital, market efficiency, and capital market openness, providing a holistic view of the investment decision-making process (Veeramani et al. 2019). The theory focuses on the perspective of investors and their motivations for allocating capital across borders. By considering factors that influence investor decision-making, such as expected returns and risk, the theory offers insights into how FDI flows are determined. The theory recognizes the importance of market forces in determining FDI flows. It highlights the role of capital market integration and the ability of investors to seek out the most attractive investment opportunities globally. This market-driven approach provides a realistic view of FDI dynamics.

The Capital Market Theory relies on several simplifying assumptions that may not fully capture the complexities of real-world investment decisions. For example, it assumes rational and profit-maximizing behaviour on the part of investors and overlooks other non-financial factors that influence investment choices, such as cultural, political, and institutional considerations (Moosa, 2002). While the theory emphasizes the role of capital markets, it tends to overlook the importance of host country-specific factors in attracting FDI. Factors such as infrastructure, skilled labour, political stability, and institutional quality are crucial determinants of FDI flows but are not explicitly considered in this theory (Palei, 2015). The theory primarily focuses on the flow of capital from developed countries to emerging or developing economies. It may not fully capture the unique dynamics and challenges associated with FDI in developing countries, where market imperfections, regulatory barriers, and institutional weaknesses may significantly influence investment decisions. The theory does not adequately address strategic motivations behind FDI, such as gaining access to new markets, acquiring strategic assets, or benefiting from synergies through vertical or horizontal integration (Yeaple, 2003). These strategic considerations may not be solely driven by expected returns or market efficiency but can significantly impact FDI decisions.

2.2.2 Product Life Cycle Theory

The Product Life Cycle Theory of FDI is an economic theory that seeks to explain the pattern and motivation of FDI based on the life cycle of a product. It was developed by Raymond Vernon in the 1960s. The theory suggests that FDI flows are influenced by the stages of a product's life cycle, from its introduction to maturity and decline (Vernon, 1966). According to the Product Life Cycle Theory, the internationalization of production occurs as a product progress through its life cycle. The theory suggests three main stages of the product life cycle. First, is the *Introduction stage*. In this stage, a new product is introduced in the market. The product is typically developed and initially produced in the home country of the firm. Firms invest in research and development (R&D) and establish production facilities to meet domestic demand. At this stage, FDI is primarily driven by the need to tap into the domestic market. Second, is the Growth stage. As the product gains acceptance and demand increases, it enters the growth stage. To meet growing demand, firms may expand production by establishing foreign subsidiaries or engaging in FDI. Firms invest in production facilities in countries with similar market characteristics or where there is high demand potential. The motivation for FDI in this stage is to serve foreign markets and avoid trade barriers. Third, is the maturity and decline stages. In the maturity stage, the product reaches its peak market saturation, and competition intensifies. Firms may start to experience declining sales and profitability. At this stage, cost considerations become crucial, and firms may choose to relocate production to countries with lower production costs through FDI. The motive for FDI is to achieve cost advantages and maintain competitiveness. The Product Life Cycle Theory suggests that FDI flows are driven by shifts in comparative advantage over a product's life cycle. Initially, firms invest in their home country to benefit from innovation and gain a competitive advantage in the global market. As the product matures, firms seek to exploit cost advantages through FDI in countries with lower production costs.

The theory has several drawbacks. The theory was developed in an era when international markets were less integrated, and technological changes were slower. In today's globalized world with rapid technology diffusion, the life cycle of products has become shorter and more uncertain, challenging the application of this theory (Iveson et al., 2022). The theory focuses primarily on market-seeking and cost-saving motives for FDI. It overlooks other strategic motives, such as accessing resources, knowledge transfer, strategic partnerships, or government

incentives, which are also important drivers of FDI. The theory was initially developed for manufacturing industries and may have limited applicability to service sectors or industries where the concept of a product life cycle is not as prominent. Despite these limitations, the Product Life Cycle Theory provides a useful framework for understanding the relationship between the life cycle of a product and FDI patterns. It highlights the importance of market-seeking and cost-saving motivations for FDI at different stages of a product's life cycle.

2.2.3 Internationalization Theory

The Internationalization Theory of FDI, also known as the Uppsala model, is an economic theory that explains the process and motivations behind firms' international expansion through FDI. The theory was developed by Jan Johanson and Jan-Erik Vahlne in the 1970s. The Internationalization Theory suggests that firms gradually increase their international involvement in a sequential manner, with the progression of internationalization occurring in stages (Johanson and Vahlne, 1990). The theory outlines four main stages of internationalization. At the initial stage, the firm has no regular export activities and operates solely in its domestic market. The focus is primarily on the home market, and the firm has limited international experience. Secondly, as the firm gains confidence and experience, it may begin to engage in export activities through independent representatives or agents in foreign markets. This stage allows the firm to gain knowledge about foreign markets, understand customer preferences, and establish initial relationships with foreign partners (Amal and Rocha Freitag Filho, 2010). Thirdly, the firm establishes its own foreign sales subsidiaries in selected foreign markets. By having direct control over sales and distribution, the firm can better serve foreign customers and respond to market demands. This stage represents a deeper commitment to international markets and allows for better market penetration. Lastly, the firm engages in foreign production or manufacturing through FDI. This involves establishing production facilities or acquiring existing companies in foreign markets. The motive for FDI at this stage is to gain cost advantages, improve market access, and enhance competitiveness in foreign markets (Brouthers and Nakos, 2004).

The theory provides a descriptive framework that captures the gradual and sequential nature of firms' international expansion. It acknowledges that firms often start with limited international involvement and gradually increase their commitment to foreign markets over time

(Khojastehpour and Johns, 2014). This sequential approach aligns with the observed patterns of internationalization in many industries and firms. The theory emphasizes the role of experiential learning in the internationalization process. Firms accumulate knowledge about foreign markets, customer preferences, and business practices as they gain experience. This learning process helps firms reduce uncertainty and make informed decisions about further international expansion. The theory recognizes the importance of market-specific knowledge in the internationalization process. Firms need to understand the unique characteristics of foreign markets, such as cultural differences, legal systems, and customer preferences. By gradually expanding their international activities, firms can acquire this market-specific knowledge and adapt their strategies accordingly (Martin et al., 2022). The theory incorporates a resource-based perspective by highlighting the role of resource commitment in internationalization. Firms need to have sufficient resources and capabilities to support their international expansion. By gradually accumulating resources and capabilities, firms become better equipped to engage in FDI and establish foreign operations.

The Internationalization Theory has been criticized for its limited generalizability across industries and contexts. The theory was primarily developed based on observations in Swedish manufacturing firms during the 1970s, and its applicability to other industries and countries may vary (Vahlne and Ivarsson, 2014). The internationalization processes in service industries or high-tech sectors, for example, may not conform to the sequential stages described in the theory. The theory places less emphasis on strategic motives for FDI, such as accessing resources, technology, or strategic partnerships. It primarily focuses on the experiential learning process and the gradual nature of international expansion. While learning and market knowledge are important, other strategic considerations may also drive firms to engage in FDI (Johanson and Vahlne, 2009). The theory tends to overlook the influence of external factors, such as institutional environments, government policies, and industry dynamics, on the internationalization process. These external factors can significantly shape firms' international expansion strategies but are not explicitly accounted for in the theory (Bıçakcıoğlu-Peynirci, 2023). The theory mainly focuses on FDI as the primary mode of internationalization, overlooking other non-equity modes, such as licensing, franchising, or contract manufacturing. These alternative modes of internationalization can be significant avenues for firms to expand their international presence without engaging in FDI (Conconi et al., 2016). While the theory provides valuable insights into the gradual nature of firms' international expansion and the role

of experiential learning, it should be complemented with other theories and frameworks to gain a more comprehensive understanding of FDI dynamics in different contexts.

2.2.4 Industrial Organization Theory

The Industrial Organization Theory of FDI is an economic theory that seeks to explain FDI based on the structure and behaviour of industries. This theory focuses on how market imperfections and industry characteristics influence the decisions of firms to engage in FDI. The Industrial Organization Theory suggests that FDI occurs due to market imperfections that create opportunities for firms to gain competitive advantages through foreign investments (Majumdar, 1980). The theory recognizes that market imperfections, such as market power, economies of scale, and barriers to entry, play a crucial role in driving FDI. By focusing on these imperfections, the theory provides insights into how firms strategically use FDI to gain a competitive advantage in foreign markets. The theory emphasizes the importance of industry characteristics in influencing firms' decisions to engage in FDI. It recognizes that different industries have unique dynamics, such as technological advancements, economies of scale, or knowledge spill overs, which can significantly impact the attractiveness of FDI (Helpman, 2006). The theory highlights the strategic behaviour of firms in seeking competitive advantages through FDI. It acknowledges that FDI can be a strategic response to gain market power, exploit economies of scale, access strategic assets, or acquire technological advancements. This perspective provides insights into the motivations and behaviours of firms engaging in FDI. The theory recognizes the potential for knowledge transfer and spill overs through FDI. By investing in foreign markets, firms can facilitate the transfer of technology, know-how, and managerial expertise, benefiting both the investing firm and the host country (Blomstrom and Kokko, 2003).

The Industrial Organization Theory of FDI relies on simplifying assumptions, such as rational behaviour and profit maximization by firms. Firms' decision-making processes are influenced by a range of factors beyond pure economic considerations, including institutional, cultural, and political factors. The theory primarily focuses on economic factors and may overlook non-economic factors, such as political risks, cultural differences, or institutional environments, which can significantly impact FDI decisions (Sabir et al., 2019). The theory's narrow focus on market imperfections may not fully capture the complex realities of FDI. While the theory acknowledges the importance of industry characteristics, it may not provide a comprehensive

explanation for the specific location choices of firms within industries (Du et al., 2008). The theory primarily focuses on the overall industry structure rather than specific host country characteristics or competitive advantages. The Industrial Organization Theory of FDI was originally developed for manufacturing industries, and its applicability to service industries may be limited. Service sectors often have different characteristics and dynamics that may not align perfectly with the assumptions and predictions of the theory.

2.2.5 Entry Mode Theory

The Entry Mode Theory of FDI explains the choices firms make regarding the mode through which they enter foreign markets. It focuses on the different entry modes available to firms, such as greenfield investment, acquisitions, joint ventures, licensing, franchising, or exporting (Chang and Rosenzweig, 2001). The theory seeks to understand the factors that influence firms' decisions to select a specific entry mode. The theory provides a decision-making framework that helps firms systematically analyse and evaluate different entry modes when expanding internationally. It considers various factors that influence entry mode choices, including transaction-specific factors, firm-specific factors, and market-specific factors. The theory recognizes that different entry modes offer different levels of control, risk, and resource commitment (Charles et al., 1990). By considering the advantages and disadvantages of each entry mode, firms can select the mode that best aligns with their strategic objectives and resource capabilities. This flexibility allows firms to tailor their entry strategies to specific market conditions. The theory acknowledges that different entry modes involve varying degrees of risk exposure. Firms can use the Entry Mode Theory to assess and manage risks associated with FDI, considering factors such as market uncertainty, political stability, cultural differences, and regulatory environments (Brouthers, 1995). This enables firms to make informed decisions and choose entry modes that mitigate risks. The theory integrates multiple factors that influence entry mode choices, including transaction-specific factors, such as asset specificity and information asymmetry, firm-specific factors, such as resources, capabilities, and experience, and market-specific factors, such as market size, cultural distance, and institutional environment (Andersen, 1997). This comprehensive approach helps firms consider the complexity of FDI decisions.

The theory assumes that firms make entry mode decisions based on rational decision-making processes, maximizing their objectives. Decision-making processes are often influenced by factors beyond pure economic rationality, such as managerial preferences, organizational constraints, and behavioural biases. The theory primarily focuses on entry mode choices at a specific point in time and may overlook the dynamic nature of FDI decisions. Factors such as changes in market conditions, technological advancements, or shifts in competitive landscapes may necessitate adjustments to entry modes over time, which are not explicitly considered in the theory (Schellenberg et al., 2017). The theory primarily focuses on transactional factors and cost considerations in entry mode decisions. While cost efficiency is important, strategic motives, such as accessing new markets, acquiring strategic assets, or leveraging synergies, may also drive entry mode choices. The theory may not fully capture these strategic considerations. The theory's applicability may vary depending on the industry, market, and specific context in which firms operate. Factors influencing entry mode choices can differ significantly across industries and countries. The theory provides a general framework, but firms need to consider industry-specific and country-specific factors to make more precise entry mode decisions (Shaver, 2013). The Entry Mode Theory of FDI offers a decision-making framework that helps firms analyse and select the most appropriate entry mode for foreign market entry. While it has strengths in providing structure and flexibility to firms' decision-making processes, its limitations lie in its assumptions of rationality, potential overlooking of dynamic factors, limited attention to strategic motives, and context-specific applicability.

2.2.6 Investment Development Path Theory

The Investment Development Path (IDP) Theory of Foreign Direct Investment (FDI) is an economic theory that explains the patterns and stages of FDI in developing countries. The theory, proposed by John Dunning, suggests that FDI flows evolve along a path as countries progress through different stages of economic development (Dunning, 1981). According to the IDP Theory, countries go through various stages in their economic development, and the nature and patterns of FDI change as they move along this path. The theory outlines four main stages. The first is the domestic-oriented stage. In this stage, domestic investment is primarily driven by local market demands, and FDI is minimal. The focus is on meeting domestic needs, and foreign investment is limited. Secondly, is the export-oriented stage. As countries develop and their industries become more competitive, they shift towards export-oriented strategies. FDI

starts to flow into the country as firms establish production facilities to take advantage of lower production costs and gain access to international markets. Thirdly, is the FDI-driven stage. In this stage, the country becomes an attractive destination for FDI due to its improving investment climate, infrastructure, and skilled labour force. FDI plays a crucial role in the country's industrialization and economic growth (Curwin and Mahutga, 2014). Fourthly, is the maturity and technology-seeking stage. At this stage, the country has developed advanced capabilities and becomes a source of outbound FDI. Domestic firms seek strategic assets, advanced technologies, and access to foreign markets through FDI.

The IDP Theory emphasizes the developmental aspect of FDI and its role in a country's economic growth. It highlights how FDI patterns change as countries progress through different stages of development, providing a framework to understand the evolving nature of FDI flows. The theory takes a long-term perspective by considering the evolution of FDI patterns over time. It recognizes that FDI dynamics are not static and that countries go through different stages with changing patterns of investment (Sawitri and Brennan, 2022). The IDP Theory considers the specific context of developing countries and the unique challenges they face. It recognizes that FDI flows, and patterns are influenced by a country's economic, social, and institutional conditions. This contextual analysis helps in understanding the specific factors driving FDI in different stages of development.

The theory simplistically categorizes countries into distinct stages, overlooking the complexity and diversity within each stage. Economic development is a multifaceted process, and countries may exhibit characteristics of different stages simultaneously. The theory does not explicitly consider the role of policy factors and government interventions in shaping FDI patterns. Policy measures, such as investment incentives, regulatory frameworks, and trade policies, can significantly influence FDI flows and may not align perfectly with the stage-based categorization. The theory's applicability is primarily focused on developing countries and may not fully explain FDI patterns in developed economies (Djokoto, 2021; Narula and Guimón, 2010). Developed countries may also experience changes in FDI patterns and motivations that are not adequately captured by the theory. The IDP Theory does not explicitly account for dynamic factors such as technological advancements, globalization, or shifts in market conditions, which can influence FDI patterns and motivations.

2.2.7 Eclectic Paradigm

The Eclectic Paradigm, also known as the Ownership, Location, and Internalization (OLI) framework, is a theory of Foreign Direct Investment (FDI) developed by John Dunning. It provides a comprehensive framework for understanding the motivations, location choices, and ownership advantages that drive FDI (Dunning, 2001). This refers to the specific advantages that a firm possesses and can leverage in foreign markets. Ownership advantages can include intangible assets such as technology, brands, patents, managerial expertise, and access to distribution networks. The ownership advantages of a firm can be a crucial factor in its decision to engage in FDI. Location advantages refer to the attributes of a particular country or region that make it an attractive destination for FDI. These advantages can include factors such as natural resources, market size, labour costs and skills, infrastructure, political stability, institutional quality, and proximity to target markets. Firms seek locations that offer a favourable business environment and enhance their competitiveness. Internalization advantages relate to the benefits that firms gain by engaging in FDI rather than using alternative market-based arrangements, such as exporting or licensing. Firms may choose FDI to internalize transactions, protect their proprietary knowledge, maintain control over assets and operations, exploit economies of scale, or reduce transaction costs.

The Eclectic Paradigm provides a comprehensive framework that integrates ownership, location, and internalization advantages, capturing the multiple factors that drive FDI decisions (Dunning, 2000). It allows for a holistic analysis of FDI motivations and provides a structured approach to understand the complexities of FDI. The framework is applicable across industries, countries, and different stages of economic development. It can be used to analyse and explain FDI decisions in various contexts, allowing for a broad understanding of FDI dynamics. The Eclectic Paradigm recognizes that FDI decisions are dynamic and influenced by changing circumstances. It considers that firms may develop or acquire new ownership, location, or internalization advantages over time, leading to shifts in FDI patterns and motivations.

Assessing ownership, location, and internalization advantages can be subjective and challenging. The identification and measurement of these advantages may vary across firms and industries, making it difficult to compare and generalize FDI decisions based on these factors (Itaki, 1991). While the Eclectic Paradigm provides a comprehensive framework, it does

not offer precise guidelines for decision-making. Firms still need to evaluate and weigh different factors based on their specific circumstances, industry dynamics, and strategic objectives. The framework primarily focuses on economic factors and may not fully capture non-economic factors, such as political risks, cultural differences, or social factors, which can significantly influence FDI decisions.

Incomplete treatment of institutional factors: While location advantages include institutional factors, the framework does not explicitly address the role of institutional environments and government policies in shaping FDI decisions. However, the Eclectic Paradigm remains a widely used and influential framework for understanding FDI. Its comprehensive nature and consideration of multiple factors make it a valuable tool for analysing and explaining FDI patterns and motivations.

2.3 Conceptualisation of economic growth

Economic growth is the most relevant topic in economics. Economic growth describes an increase in a country's wealth over a period, reflecting the economic performance in the given period. The uneven and unbalanced economic growth reveals the differences between the rich and the poor countries in the world. Rostow (1959) categorized the stages of economic growth in modern economic history as the traditional society, preconditions for take-off, the take-off, the drive to maturity, and the age of high mass consumption. The gradual processing stages indicate modern technology applied in society plays an important role in the evolution and development of the industry. Besides, the political, social, and demographic factors are paramount in the process of growth. The favourable government policy and social structure create a moderate environment for economic production. Sufficient and skilled labour enables higher productivity and economic output. Economic growth is not only about aggregate output, but also the transformation of sectoral structure, demographic and geographic makeup, and the entire social and institutional fabric (Acemoglu, 2012). Colin Clark (1940) explains the importance of the different dominant sectors at different stages. He designates the process of economic development and modernization by primary (agriculture), secondary (manufacturing), and tertiary (trade and service) production. Kaldor (1957) states that there are three general critical determinants of the rate of growth: savings propensities of the community determine the rate of capital accumulation; the flow of invention or innovation determines the rate of growth of productivity; and the growth of population. However, these are rooted in the

form of dynamic propositions about supply, demand, and the pattern of production (Rostow, 1959).

What factors affect economic growth has become a long-lasting discussion. The financial system plays a crucial role in economic growth. The development of the financial system and the associated provision of financial claims and services have positive effects on economic growth (Patrick, 1966). Levine (1997) suggests that financial functions may affect economic growth through two channels: capital accumulation and technological innovation. Speaking of capital accumulation, financial instruments, markets, and institutions can mitigate information and transaction cost, which has an influence on saving rates, investment decisions, technological innovation, and long-run growth rates (Lucas, 1988). The technology innovation focuses on the invention of new production processes and goods. Steady-state growth is driven by technological change that arises from intentional investment decisions made by profit-maximizing agents (Romer, 1990). Arestis (2001) has studied the relationship between stock market development and economic growth in five developed economies. The results postulate that bank-based financial systems can promote long-term growth better than capital-market-based ones. Specifically, stock markets and backs have positive and significant contributions to the economic growth in France, Germany, and Japan, but the causal relationship between financial development and economic growth in the United Kingdom and the United States is statistically weak.

Knowledge is also regarded as a significant factor that has an impact on economic growth. As an external factor, knowledge can increase marginal productivity since it is an input in production (Romer, 1989). Perez-Trujillo & Lacalle-Calderon (2020) examined the impact of accessing knowledge and innovation on economic growth using an augmented Solow-Swan growth model and panel data methodology with 138 countries from 1990 to 2014. The results denote that to access innovation and knowledge has a positive impact on economic growth by cultivating the technological catch-up process and accelerating the pattern of economic convergence. Kijek et al. (2022) evaluated the impact of the knowledge economy on economic growth in 20 developing countries during the period from 1996 to 2020 using the cumulative regression model, the fixed-effect and random-effect model. They found that the knowledge economy plays a prominent role in maintaining a high rate of growth in developing countries and has a great impact on economic growth. However, investing on education and patents for residents has a negative impact on economic growth. However, in the study of Shobande

and Asongu (2021), the greater investment in education successfully causes economic growth in South Africa when they estimate whether knowledge accumulation has an impact on increasing productivity and promoting economic growth in Nigeria and South Africa using Vector Autoregressive and Vector Error Correction approach. A unidirectional Granger causality between knowledge and growth has been observed in Nigeria, whereas a bidirectional causality is observed in South Africa. This chapter gives an overview of economic growth and its determinants. The chapter 2.4 will provide a detailed and sophisticated elaboration of factors that contribute to production output based on different theories of economic growth.

2.4 Theories of economic growth

Economic growth theories help us understand various aspects and dynamics of economic development and the factors that contribute to sustained increases in output, income, and living standards. They help us understand the drivers, dynamics, and consequences of economic growth, providing a framework for policymakers, researchers, and economists to analyse and shape policies that promote sustained and inclusive economic development. In this section, the study reviews novel theories that shaped economic growth literatures for decades. The theories include the Malthusian Growth Model, Classical Growth Model, Harrod-Domar Growth Model, Neo-Classical Growth Model, Endogenous Growth Model, Semi-Endogenous Growth Model, and the Unified Growth Theory.

2.4.1 Malthusian Growth Model

The earliest formal economic growth theory is often attributed to the work of Robert Malthus, an economist who proposed the Malthusian Theory of Population in the late 18th century. Malthus argued that population growth would eventually outpace the growth of food supply, leading to a state of subsistence-level living for most of the population (Malthus, 1798).

Malthusian Growth Theory focuses on the dynamics of population growth. Malthusian Growth Theory suggests that there is a natural tendency for population to reach an equilibrium with available resources. When population exceeds the capacity of resources to sustain it, checks on population growth, such as famine or disease, restore the balance. Malthus argued that the

constraints of resource scarcity and population growth place limits on sustained economic development. As population increases, per capita income and living standards are driven towards a subsistence level. Malthusian Growth Theory led to debates and discussions about policies to manage population growth and resource constraints. Malthus himself advocated for preventive checks, such as moral restraint and delayed marriage, to control population growth. However, the theory has been criticized for its pessimistic view and its lack of recognition of technological progress and innovation as drivers of economic growth.

One of the main limitations of Malthusian Growth Theory is its assumption of fixed resources. In the real world, technological advancements, innovation, and shifts in production methods can lead to increased resource availability and productivity (Chatterjee and Vogl, 2018). The theory does not account for the potential for human ingenuity to overcome resource constraints. Secondly, Malthusian Growth Theory assumes slow or negligible technological progress, underestimating the role of technological innovations in expanding resources and improving productivity (Galor and Weil, 2000). Subsequent growth theories have emphasized the importance of technological advancement in economic development. Thirdly, the theory's assumption of diminishing returns to land and its focus on population growth as the primary driver of resource scarcity oversimplifies the complexities of economic growth. It does not consider other factors, such as human capital, institutions, trade, and policy interventions, which can significantly influence economic development (Barro, 2001). Fourthly, Malthusian Growth Theory did not account for the demographic transition that occurs as societies develop. In many countries, population growth rates tend to decline as living standards improve, access to education and healthcare increases, and family planning becomes more widespread (Peterson, 2017).

The Malthusian Growth Theory provided valuable insights into the relationship between population growth and resource constraints during its time. However, its limitations and oversimplifications have led to the development of more comprehensive growth theories that incorporate technological progress, human capital, and institutional factors in explaining economic development and population dynamics.

2.4.2 Classical Growth Model

This theory was developed by economists such as Adam Smith and David Ricardo. It suggests that economic growth is driven by the accumulation of physical capital, such as machinery and infrastructure, and an increase in labour supply. According to this theory, factors such as technological progress, investment in physical capital, and population growth contribute to long-term economic growth (Eltis, 2000).

This research addresses the contributions by Adam Smith which are the foundations of ideas in the classical school of thought. Firstly, Smith emphasized the importance of the division of labour as a key driver of economic growth (Robinson and Subrick, 2020). He argued that when workers specialize in specific tasks, they become more skilled and efficient, leading to increased productivity and output. Secondly, Smith's theory emphasized the role of free markets in promoting economic growth (Ucak, 2015). He believed that individuals pursuing their self-interests in a competitive market would lead to optimal outcomes for society. That is, through the invisible hand mechanism, market forces allocate resources efficiently, encourage innovation, and drive economic growth. Thirdly, Smith recognized the importance of capital accumulation for economic development. He argued that when individuals save and invest their surplus income, it leads to the accumulation of capital, which, in turn, fosters economic growth by enabling the purchase of machinery, technological advancements, and increased production (Wolloch, 2020). Fourthly, Smith advocated for international trade as a means of expanding the market and benefiting from specialization. By trading goods and services, countries can focus on producing what they are comparatively more efficient in, leading to increased productivity and overall economic growth (Tribe, 2006).

Adam Smith's growth theory is not without limitations and is one of the oldest growth models. Firstly, Smith's theory places little emphasis on the role of government in promoting economic growth. Turnovsky (1999) finds that an open economy can tend to have a larger size of government. While he recognized the importance of government in maintaining law and order and providing public goods, his laissez-faire approach may not adequately address issues such as market failures, externalities, and income inequality, which can hinder economic growth. Secondly, Smith's analysis does not fully account for the role of institutions in economic growth. Institutions, such as the legal system, property rights, and social norms, can

significantly influence economic outcomes. Acemoglu et al. (2005) contributed those differences in economic prosperity is also strongly attributed to the differences in economic institutions. They argue that this can solve the problem of economic growth and development. Smith's theory tends to assume that institutions naturally develop and function efficiently, without considering their potential variations or weaknesses. Thirdly, Smith's theory focuses primarily on market activities and monetary transactions, neglecting other important aspects of economic growth, such as social and environmental factors. For example, the impact of social capital, human capital, and environmental sustainability on economic growth receives limited attention in his work. According to Barro (2001) education is one of the main determinants of long-term economic growth. The study postulates that the quality of education matters more than the quantity, and this determines the human capital. Fourthly, Smith's theory does not extensively address income distribution concerns. While he acknowledged that the pursuit of self-interest can generate inequalities, he believed that overall growth would benefit society. However, modern perspectives highlight the importance of inclusive growth and equitable distribution of resources for long-term economic stability and social cohesion (Topuz, 2022).

It is worth noting that Adam Smith's economic growth theory was developed over two centuries ago and needs to be considered in the context of its time. While his ideas laid the foundation for modern economics, subsequent economists have built upon and refined his work to address some of the limitations and complexities of economic growth.

2.4.3 Harrod-Domar Growth Model

The Harrod-Domar growth model is an economic theory that focuses on the relationship between investment and economic growth (Domar, 1946; Harrod, 1939).

There are few key contributions of this theoretical model. Firstly, the Harrod-Domar model emphasizes the role of investment as a key driver of economic growth. According to the model, an increase in investment leads to an expansion in aggregate demand, which in turn stimulates economic activity and output growth (Le Bourgeois, 1989). The model highlights the importance of maintaining a certain level of investment to achieve full employment and avoid cyclical instability. It suggests that a stable and sustained rate of investment can help stabilize the economy by creating jobs and maintaining high levels of output. Secondly, the Harrod-

Domar model provides policymakers with a framework for understanding the relationship between investment and growth. It suggests that government intervention can be used to influence investment levels and promote economic development (Sato, 1964). For example, fiscal policies such as tax incentives or public infrastructure projects can stimulate private investment and overall growth. The Harrod-Domar model is relatively simple and intuitive, making it accessible to a wide range of audiences. Its straightforward formulation allows for easy interpretation and application in economic analysis and policy discussions. According to Easterly (1999) the model has phased out but economists in international financial institutions have continued to utilize it to calculate the required investment given growth potentials.

There are several drawbacks of this model. Firstly, the Harrod-Domar model assumes a fixed capital-output ratio, meaning that the amount of capital required to produce a unit of output remains constant over time. Realistically, the capital-output ratio can vary due to technological changes, shifts in production methods, and changes in the composition of output. This assumption limits the model's ability to capture the complexities of real-world economic dynamics (Dal Colle Stievano, 2004). Secondly, the model focuses primarily on investment as the driver of economic growth, neglecting the role of productivity improvements and technological progress. Realistically, sustainable growth is heavily dependent on factors such as innovation, research and development, human capital, and technological advancements, which are not adequately captured by the Harrod-Domar model (Yalçınkaya et al., 2017). Thirdly, the model does not address structural issues within an economy, such as income distribution, institutional quality, or resource allocation. These factors play a crucial role in shaping long-term growth prospects and are not explicitly accounted for in the Harrod-Domar framework. According to Corriveau (2021), long-run growth depends on the evolution of economic institutions. Fourthly, the model assumes a stable relationship between investment and output growth, neglecting potential instabilities and feedback effects. It does not consider factors such as uncertainty, financial crises, or investment fluctuations that can disrupt the relationship between investment and growth (Jermann and Quadrini, 2012).

The Harrod-Domar model is more suitable for analysing developing economies with underutilized resources and high investment needs. It may not capture the dynamics of advanced economies, where other factors, such as technological progress or productivity gains, become more critical for sustained growth. While the Harrod-Domar growth model provides a useful framework for understanding the role of investment in economic growth, its assumptions

and limitations restrict its applicability in capturing the complexities of real-world economic dynamics. Subsequent models and theories have been developed to address these limitations and provide a more comprehensive understanding of economic growth.

2.4.4 Neoclassical Growth Model

The neoclassical growth model is an economic framework that seeks to explain long-term economic growth through the interaction of factors such as capital accumulation, technological progress, and labour supply. It is often associated with the work of economists Robert Solow and Trevor Swan in the 1950s and 1960s. The neoclassical growth model is built upon solid theoretical foundations of microeconomics and general equilibrium theory. It provides a rigorous framework for analysing the determinants of long-term economic growth.

This model provides several contributions. Firstly, the model highlights the importance of capital accumulation and technological progress in driving economic growth. It recognizes that sustained increases in productivity are crucial for long-term economic development (Baaquie, 2019). Secondly, the neoclassical growth model has policy implications. It suggests that policies aimed at promoting capital accumulation, technological advancement, and sound macroeconomic management can foster economic growth (Solow, 1957). Thirdly, the neoclassical growth model explains convergence in income levels across countries. It suggests that countries with lower initial levels of capital and technology tend to grow faster and catch up to countries with higher initial levels, leading to income convergence over time (Barro and Xavier Sala-i-Martin, 1992).

Every model has some limitations and so does the neoclassical growth theory. Firstly, the neoclassical growth model assumes perfect competition, which may not accurately reflect real-world market conditions. In fact, markets often exhibit imperfections such as monopolies, market power, and externalities, which can influence investment decisions and productivity growth (Stiglitz, 1989). Secondly, the model largely ignores the role of institutions, social norms, and governance structures in economic growth. Institutions, such as the legal system, property rights enforcement, and political stability, can significantly impact investment decisions and productivity growth, but they are not explicitly considered in the neoclassical growth model (Corriveau, 2021). Thirdly, while the neoclassical growth model recognizes the

importance of physical capital, it tends to underemphasize the role of human capital and education in driving economic growth. Human capital, including skills, knowledge, and education, is a critical determinant of productivity and innovation (Mankiw, Romer, and Weil, 1992). Fourthly, the neoclassical growth model assumes exogenous technological progress, meaning that technological advancements occur independently of economic factors. However technological change is often endogenous and influenced by factors such as research and development, innovation, and learning by doing (Trimborn, 2018). Lastly, Inequality and distributional issues: The neoclassical growth model does not explicitly address issues of income inequality and distributional effects. While economic growth can lead to overall improvements in living standards, it does not guarantee equitable distribution of benefits (Topuz, 2022). Inequality can have social and economic consequences that impact long-term growth prospects.

The neoclassical growth model provides a useful framework for understanding the relationship between capital accumulation, productivity growth, and economic development. Its limitations are addressed by other growth models.

2.4.5 Endogenous Growth Model

The endogenous growth model is an economic theory that seeks to explain long-term economic growth by focusing on factors that are endogenously determined within the economy itself. Unlike the neoclassical growth model, which assumes technological progress as exogenous, the endogenous growth model emphasizes that technological change and innovation are generated from within the economic system (Lucas, 1988).

The model has challenged the exogenous growth model by providing several contributions. Firstly, the model recognizes the central role of knowledge, innovation, and technological progress in driving economic growth (Aghion and Jaravel, 2015). By emphasizing the endogenous nature of these factors, the model highlights the importance of investments in research and development (R&D), education, and human capital formation (Romer, 1986). Secondly, the endogenous growth model incorporates increasing returns to scale, meaning that the more inputs an economy uses, the greater the output per unit of input (Fine, 2000). This allows for the possibility of sustained growth even without diminishing returns, as seen in the

neoclassical growth model. Thirdly, the model recognizes the positive spill over effects of knowledge and technology on the overall economy. Investments in R&D and innovation can lead to knowledge diffusion, benefiting other firms and industries and promoting overall productivity growth (Li, 2002). Fourthly, the endogenous growth model provides policy insights into fostering long-term economic growth. It highlights the importance of policies that promote investments in education, R&D, intellectual property protection, and technology adoption, which can enhance a country's growth potential (Shaw, 1992). The model explains persistent differences in growth rates among countries. Countries that invest more in education, R&D, and innovation are likely to experience higher growth rates over the long run, leading to divergent levels of economic development.

The model is not without limitations. Firstly, factors such as Knowledge, innovation, and human capital are difficult to measure accurately. Unlike physical capital, which can be quantified relatively easily, measuring intangible assets and their contributions to growth poses challenges for empirical analysis and policy formulation. Secondly, while the endogenous growth model incorporates increasing returns to scale, it often assumes constant returns to scale to facilitate mathematical tractability. This assumption may not hold, as there are likely to be diminishing returns or other complexities in the relationship between inputs and outputs (Brindley, 1995). Thirdly, the endogenous growth model typically assumes perfect competition and the absence of market imperfections. However, markets may be characterized by imperfect information, externalities, and other distortions, which can affect the generation and diffusion of knowledge and innovation (Ho, 1996). Fourthly, the model does not explicitly address the role of institutions and governance in driving economic growth. Institutions, such as the rule of law, property rights protection, and political stability, play a crucial role in promoting innovation, entrepreneurship, and investments in knowledge capital (Corriveau, 2021). Lastly, the endogenous growth model tends to neglect the role of natural resources and the importance of sustainable resource management. The depletion of natural resources and environmental degradation can have significant implications for long-term growth and need to be considered in the growth model (Singh et al., 2023).

2.4.6 Semi-Endogenous Growth Model

The Semi-Endogenous Growth Model is an extension of the endogenous growth theory that seeks to explain economic growth through a combination of endogenous and exogenous factors. It was developed by Charles Jones in 1995. While endogenous growth theory focuses on the internal factors such as human capital, innovation, and knowledge creation, the semi-endogenous growth model recognizes that some factors, such as technological progress, are partially influenced by exogenous forces (Cozzi, 2017). The model acknowledges that certain factors that contribute to economic growth, such as technological progress or spill overs from other industries, are influenced by exogenous forces beyond the control of individual agents. By including exogenous elements, the model provides a more comprehensive framework that captures the interaction between endogenous and exogenous factors in driving growth (Jones, 2005). The Semi-Endogenous Growth Model recognizes that sustained economic growth requires continuous improvements in productivity. It highlights the importance of factors such as innovation, research and development, and technological progress in enhancing productivity and generating long-term growth. By focusing on these factors, the model offers insights into how policies and investments can promote productivity growth (Barcenilla-Visús et al., 2014). Like the endogenous growth theory, the Semi-Endogenous Growth Model incorporates endogenous factors like human capital, education, and knowledge creation as key drivers of economic growth. It recognizes the role of investment in human capital and knowledge accumulation in fostering innovation and productivity improvements, contributing to sustained economic expansion. While the Semi-Endogenous Growth Model provides valuable insights into the combined influence of endogenous and exogenous factors on economic growth, it has limitations in terms of measuring exogenous forces, providing specific policy guidance, addressing structural factors, and considering distributional effects. Integrating this model with other theories and frameworks can lead to a more comprehensive understanding of the complex nature of economic growth.

2.4.7. Unified Growth Theory

Unified Growth Theory, developed by economists Oded Galor and David Weil, is an attempt to explain the long-term process of economic growth and the historical transition from stagnation to sustained growth. It integrates elements of both endogenous growth theory and

historical analysis to provide a comprehensive framework (Lagerlöf, 2006). Unified Growth Theory takes a long-term historical perspective, considering factors that have influenced economic growth over centuries. It examines the interaction between economic, demographic, technological, and institutional changes throughout history to understand the patterns and determinants of growth. The theory combines endogenous growth theory's emphasis on internal factors, such as human capital accumulation and innovation, with exogenous factors such as demographic changes, technological progress, and institutional development (Galor, 2011). By integrating these factors, the theory provides a more comprehensive explanation of the drivers of economic growth. Unified Growth Theory recognizes the central role of human capital in economic growth. It emphasizes the accumulation of skills, education, and knowledge as key drivers of productivity improvements and technological progress. The theory highlights the existence of feedback loops between economic growth and various factors. Positive feedback mechanisms, such as the "demographic-technological feedback loop," suggest that demographic changes, such as population growth or changes in age structure, can influence technological progress and vice versa. These feedback loops create self-reinforcing dynamics that shape long-term growth patterns (Galor and Weil, 2000).

Unified Growth Theory is a complex framework that attempts to explain historical processes and long-term growth dynamics. This complexity poses challenges for empirical analysis and testing. Historical data limitations and the difficulty of quantifying and measuring certain variables can make it challenging to fully validate the theory's predictions and hypotheses. The theory acknowledges that the determinants of growth can vary across countries, regions, and historical periods (Galor, 2007). The specific combinations of factors that drive growth in one context may not be directly applicable to another. This heterogeneity poses challenges when trying to apply the theory to diverse real-world contexts. While Unified Growth Theory offers insights into the historical process of economic growth, it provides fewer direct policy prescriptions. The theory does not provide specific guidance on policy measures that policymakers should adopt to foster sustained growth. It is more focused on explaining historical patterns than offering prescriptive policy recommendations. While Unified Growth Theory acknowledges the importance of institutions in shaping growth, it does not explicitly incorporate institutional factors in the same way as some other growth theories. Institutions play a critical role in facilitating or hindering economic activity, and their inclusion could provide a more comprehensive understanding of growth dynamics.

2.5 The nexus between foreign direct investment and economic growth

The nexus between FDI and growth have been studied extensively. In this section, this study analyses the novel findings from the literature, past and present. The empirical review culminates in scholars that postulate a positive and negative nexus of FDI on economic growth. The role of FDI on growth can be ambiguous and depends on the level of development of the country. Besides, the structures of the economy are an important factor in attracting investments. An example is the financial structure which includes financial institutions, markets, and technology. Using data of 20 OECD and 51 non-OECD countries from 1975 to 1995, Alfaro et al. (2007) finds that countries with better financial systems can attract FDI efficiently, and those with highly developed financial markets experience a high inward FDI investments. Their study reveals that inward FDI is endogenous, especially in countries with developed financial markets, and is exogenous in countries where financial markets are not part of the mainstream economy. Azman-Saini et al. (2010) found that financial markets development, when it is high, is significant in moderating the FDI and growth nexus. They find that the growth in FDI start increasing when there are increases in private sector credit, which they used as a proxy for financial development. Using data from 1975 to 2005, they find that FDI does not increase without the increase in financial sector development. Actually, from when the new wave of FDI began around 1985-1986, FDI plays an important role in financing international current account imbalance (Krugman, 1993).

A novel study by De Mello (1999) on OECD and non-OECD countries finds that the FDI-growth nexus is sensitive to latent factors that are country-specific. The emphasize that the technological gap strongly influence the FDI-growth nexus. Countries that have less technology advancement benefit more from FDI than the advanced economies which are technology leaders. In the developing country of Mexico, FDI generates benefits in the form of increased employment and technological spill overs (Waldkirch, 2011). FDI spill overs can be facilitated by technologies and management practices from foreign firms. This analogy is related to the concept of returns-to-scale which is the link between the increase in output and input in the long run (Weinschenk, 2022). In countries where technology progress is lower there will be an increasing return to scale as output is assumed to increase by more than the proportional change in inputs. In advanced economies there will be decreasing returns to scale as output is assumed to increase by less than the proportional change in inputs.

Besides the arguments by various on scholars on the direct nexus of FDI on economic growth, some scholars emphasize that this nexus depends on the absorptive capacity of a country. For example, Durham (2004) found that financial and institutions development are significant in explaining FDI-growth nexus. The study interacted FDI and stock market as proxy for financial development and interacted FDI and property rights and regulation index as proxies of institutions development. The relationship between FDI and growth is less volatile because it is costly to withdraw the investment. Ayenew (2022) conducted a panel for sub-Saharan African countries and found that FDI to be beneficial to growth in the long-run and is insignificant in the short-run.

Campos and Kinoshita (2002) conducted a panel study of 25 Central and Eastern Europe countries and former Soviet Union with a sample period 1990-1998. They found that inward FDI is highly and positively significant in explaining these countries' economic growth. Similarly, Azam et al. (2016) got the results revealing that FDI stimulates the long-run economic growth in Europe and Central Asia (ECA) by employing a panel cointegration test for long-run examinations. The author investigated the effects of external sources including FDI on economic growth measured by real GDP per capita covering 12 countries in ECA over the period of 1993-2013. The findings show FDI inflows have significant positive effects on economic growth, and it is one of the vital resources for economic growth in ECA. Unlike the previous results, Naveed and Shabbir (2006) found FDI is not significant in influencing the growth rate of GDP per capita when studying the impact of FDI and trade openness on economic growth in 23 OECD countries from 1971 to 2000. In their study, its trade openness that had a significant effect on growth.

Using data from 1980 to 1996, Moudatsou (2003) found that FDI positively affect economic growth in the European Union countries. The study finds that the FDI affect growth through trade reinforcements. Direct investment can have significant trade and employment effects at the industry or regional level (McCulloch, 1993). The beneficial effect of FDI on economic growth and more efficient utilization is stronger in those countries which pursue an export promotion (EP) strategy (Balasubramanyam et al., 1996). The paper examining the effect of FDI on economic growth also found the export promotion trade regime is playing an important role in the growth impact of FDI comparing to the import substitution (IS) (Atique et al., 2004). Besides, human capital is also an important factor in enhancing economic growth. A novel study by Borensztein et al. (1998) finds that FDI significantly contributes to economic growth

in developing countries when a sufficient human capital stock is available in the host countries. This was achieved by interacting FDI and human capital indicator to obtain the estimation. They postulate that FDIs are tangible assets and are less sensitive to financial constraints. FDIs tend to remain in the country and become defensive assets compared to securities which can exhibit capital flight in a short period. These scholars also postulate that FDIs reduce the cost of findings new capital and can increase the speed at which new goods and services are introduced. Bartolini and Drazen (1997) found that countries that attract FDIs tend to be committed to maintaining stable macroeconomic and financial stability policies. This is to ensure that there is the mechanism for efficiently allocating resources from foreign countries and creating an enabling environment for high economic growth. In addition to FDIs, foreign bank investment can increase the market share of the financial sector in the economy (Baldwin and Forslid, 2000). Capital provided to profitable business projects through credit has a positive effect on economic growth. Foreign banks can increase the quality of domestic credit ratings.

Some scholars assess how FDI deepening affect growth in a single economy. For example, based on the neoclassical and endogenous growth model, Hoang et al. (2010) developed the panel data model and included determinants of the economic growth rate. In addition to FDI, these covariates are labour, human capital, domestic investment, exports, and imports in individual provinces. The results showed that there was a strong and positive effect of FDI on economic growth across 61 provinces in Vietnam from 1995 to 2006. Economic growth could be increased as the FDI leads to an increase in the stock of capital, while FDI did not affect economic growth through the interaction with human capital and trade. Therefore, they postulated that advanced technology and knowledge transfer from FDI did not have an impact on economic growth in Vietnam. Wijeweera et al. (2010) applied a stochastic frontier model and panel data covering 45 countries over the period from 1997 to 2004 to study the relationship between FDI and GDP growth rate. They drew the conclusion that FDI itself does not increase economic growth, but it can exert a positive impact on economic growth when highly skilled labour is presented. Slightly increasing FDI could not induce efficiency gains, and poor countries can improve their economic growth rate by strongly encouraging FDI. A less studied phenomenon of FDI deepening is the FDI and growth volatility nexus. Mensah & Mensah (2021) studied this nexus for 34 OECD countries and find that FDI is associated with high output volatility in capital-intensive industries. This can serve as a policy guide of where should FDIs be targeted in the economy.

Luu et al. (2017) examined the impact of FDI on economic growth in Vietnam through a comparative analysis of the pre-crisis period from 1999-2006 and the post-crisis period from 2010-2014. They found FDI exhibits a significant positive effect on economic growth in the full sample. The simultaneous relationship only exists in the post-crisis period when increased inward FDI contributes to economic growth, the increasing economic growth attracts more FDI capital. However, in the pre-crisis period, FDI still has a significant impact on economic growth while economic growth is insignificant for FDI. The study also considered the 2007/2008 financial crisis as dummy variables for the possible effect on FDI and economic growth. They found that the financial crisis has a negative effect on economic growth. Saleh (2023) conducted a literature review study and found that economic and financial crises have a negative and significant impact on FDIs. The study also postulates that the interaction between FDI and crises leads to decrease in economic growth in the host country. That is, crises have a negative and indirect effect on economic growth and create a macroeconomic environment where FDI flows decrease in the host country. Also, the crises have a negative and direct effect on profitability of FDI investors by increasing the costs of operations in the host country.

According to Ghosh Roy and Van den Berg (2006), FDI and GDP have a bi-directional relationship. They studied whether FDI stimulates economic growth in the United States (U.S.). This means FDI has a direct effect on GDP, and GDP has a direct impact on FDI. With the use of Simultaneous Equation modelling, they estimated a positive and significant effect for the U.S. This exemplifies that even a developed country can benefit from FDI inflows and can keep attracting inward foreign investment. Similar results are confirmed when Kosztowniak (2016) investigates the relationship between FDI and GDP in Poland from 1992 to 2012. Bi-directional relationships are estimated by a Vector Error Correction analysis, and the impact of GDP on FDI inflows is stronger than the reverse causality in Poland. Wijeweera et al. (2010) conducted Granger Causality Test for FDI and Real GDP. The Granger Causality Test results confirm the suitability of GDP as the dependent variable because there is a strong one-way causality from real GDP to FDI. The study of the causality of FDI, economic growth, and financial development by Suliman and Elian (2014) reveals that there is one-way causality between FDI and economic growth.

In southeast European countries, Mehic et al. (2013) estimated the effect of FDI on economic growth covering the period from 1998 to 2007 by applying Prais-Winsten regression with panel-corrected standard errors. The paper also postulates that there is a positive and significant

effect on economic growth, including domestic investment. Other control variables such as trade openness, and macroeconomic stability also play a particularly important role in economic growth. Curwin and Mahutga (2014) studied the effect of FDI on economic growth in post-socialist transition countries, Central and Eastern Europe and Eurasia, by a panel regression model. They found that an increase in FDI penetration has a negative effect on economic growth. They postulate that a small increase in FDI penetration can promote economic growth. However, if it increases too quickly, it can lead to economic contraction. They advise that less FDI penetration is better than more, and that domestic investment is better for growth than foreign investment.

In the open economies, financial integration enables all types of investments to take place with ease. Alfaro et al. (2004) examine the role of local financial markets in the effect of FDI on economic growth using cross-country data between 1975 and 1995. The empirical analysis indicates that FDI alone plays an important role in economic growth, and countries with better financial systems can gain FDI more efficiently. Bekaert et al. (2006) found that countries with greater financial openness have lower consumption growth volatility. They support that foreign capital can smooth consumption and enable an increase in people's welfare. This means that the more capital is available in the economy the more people can access credits markets. Through these markets, people can borrow to finance profitable business projects. Some people can borrow to purchase personal goods and services and pay off their debts over the long run.

Borensztein et al. (1998) postulate that FDIs are tangible assets and are less sensitive to financial constraints. FDIs tend to remain in the country and become defensive assets compared to securities which can exhibit capital flight in a short period. These scholars also postulate that FDIs reduce the cost of findings new capital and can increase the speed at which new goods and services are introduced. Bartolini and Drazen (1997) found that countries that attract FDIs tend to be committed to maintaining stable macroeconomic and financial stability policies. This is to ensure that there is the mechanism for efficiently allocating resources from foreign countries and creating an enabling environment for high economic growth. In addition to FDIs, foreign bank investment can increase the market share of the financial sector in the economy (Baldwin and Forslid, 2000). Capital provided to profitable business projects through credit has a positive effect on economic growth. Foreign banks can increase the quality of domestic credit ratings.

FDI also comes with some costs which can include market concentrations, domestic resource allocation problems, loss of control of macroeconomic policies, increased volatility in the financial markets, and risk of foreign banks' high market share. In the 1990s countries that lacked capital experienced increases in FDIs (Fernández-Arias and Montiel, 1996). Foreign firms saw an opportunity to obtain a high rate of returns and repatriate high profits to home countries. Most of the recipients were middle-income countries in Latin America, China, India, and countries in Sub-Saharan countries with rich mineral resources (Basu and Srinivasan, 2002). FDIs will not have positive long-run growth effects if the investments are allocated to projects that are not sustainable. Countries with weak financial systems, such as weak and deregulated banks, can hamper the development of domestic capital and lead to divestment of capital in the long run (Razin et al., 2000). Foreign firms can possess greater knowledge and adequate information about the country they invest in. This places them at an advantage over local firms and creates information asymmetry problems (Gopinath, 2004). This means that local firms can inherit high cost of accessing market information in the long run than their foreign counterparts. Countries where markets are dominated by FDIs risk losing control of their macroeconomic stability policies. For example, their exchange rate can be sensitive to inflows and outflows of capital, an extremely high influx of capital can shock inflation negatively, and a high money supply can cause monetary policy uncertainty (Aghion et al., 2004).

Bellak et al. (2008) finds that there is an interaction between labour costs and FDI when labour productivity is low in the Central and Eastern European countries. They find that high labour costs affect FDI inflows negatively and high labour productivity affect FDI inflows positively. Therefore, they propose that unit labour cost be a moderating factor because it a ratio of labour cost to labour productivity. A study by Bayraktar-Sağlam and Sayek Böke (2017) also find that negatively affect FDI investments and suggest that labour productivity be controlled for in future empirical studies. A novel study by Nketiah-Amponsah and Sarpong (2019) finds that the causal of effect of FDI on economic growth is maximized when interacted with infrastructure in 46 countries of Sub-Saharan Africa from 2003 to 2017. In their study, they conclude that FDI effect on growth is significant only when interacted with infrastructure. Partially, Palei (2015) finds that infrastructure has a positive effect on economic growth in 124 countries. The proxy for infrastructure deployed is the quality of roads, railroad infrastructure, air transport and electricity supply. The study suggest that infrastructure development has a

positive impact on economic growth by fostering productivity, competitiveness, and attracting investments.

Trojette (2016) finds that institutions matter in the FDI and growth nexus. Institutions moderate this relationship significantly only above a certain threshold. However, the study finds that the indirect effect of FDI through institutions depends on the country's level of income. A greater effect of FDI on economic growth is noticeable in middle income countries than in high income countries. The author utilizes political risk index as a proxy for institution. It is important to utilize country risk index because it's a broader measure that is associated with FDI investments. Multinational Corporations use country risk index as a screening quantitative tool to avoid investing in countries with excessive risk. A divestment can occur when active investors find that the country risk excessive. All cross-border transactions are affected by country risk which arise from political, economic, and financial risks. According to Hassan, A.S. (2022) country risk is significance in moderating the effect of FDI inflows on economic growth in the Visegrád 4 countries and has a negative effect on FDI inflows. This study utilized variables data from 1991 to 2020. They find that country risk in the Visegrád countries has been rising steadily within the sample period. Therefore, country risk is an important moderating factor between FDI and economic growth.

When it comes to the China's OFDI in V4 countries, there is lack of empirical studies on the FDI-growth nexus. For example, a recent study by Fifeková and Nemcová (2015) conducted a qualitative study on the effect of FDI on growth in the V4 with a sample from 1996 to 2015. They analysed the data of FDI inflows as percentage of GDP to make readers understand the size of FDI in the V4 region. Their conclusion is that FDI has a positive effect on V4's economic growth. Meunier (2014) analysed whether it is a positive-sum game or zero-sum game for both Chinese investors and investees in the EU using a qualitative approach. The study found Chinese investment is beneficial to the investees since China saved a lot of companies from bankruptcy and even put in additional investments to improve the operation.

Same conclusion was drawn by an empirical study of foreign investment and productivity growth in Czech Republic during 1992 to 1996 by Djankov and Hoekman (2000). They found there is positive and statistically significant impact of foreign investment on total factor productivity growth of recipient firms by transferring new technologies and knowledge to the host firms. Sass, Gál and Juhász (2018) studied the impact of FDI in four selected service

industries of the Visegrád countries on the host economy in export and employment by using panel regression-based modelling of industry effects from 1999 to 2013. They differentiated the FDI by vertical and horizontal nature. The results reveal that FDI affects exports in the telecommunications and business services, while there is a significant negative correlation between FDI and exports in finance services.

There are some empirical researches that focused on the nexus of FDI and economic growth in transition economies, which included V4. Developing countries, emerging economies, and countries in transition regard FDI as an important external source to enhance economic development, income growth, and employment (OECD, 2002). Campos and Kinoshita (2002) examined the effects of FDI on growth for 25 Central and Eastern European and former Soviet Union transition economies between 1990 to 1998. The results advocate that FDI had a significant positive effect on the economic growth with technology transfer. It is aligned with Solow growth model that economic growth is the embedded technology transfer in FDI. However, different results reveal in the panel study of investigating the existence and the nature of the effect of FDI on the growth rate of transition economies in Eastern European and Balkan countries (Lyroudi et al., 2004). They applied Bayesian analysis and found that FDI does not exhibit any significant relationship with economic growth for the transition countries.

Chinese scholar, Jiang (2018), examined the relationship between China's OFDI in countries along the Belt and Road and bilateral economic growth. In the context of BRI, a good host country's system can promote the effect of China's OFDI on bilateral economic growth. And the poor infrastructure in the host country would exert a positive effect of FDI on bilateral economic growth. The investment environment in the destination country is very important for attracting FDI.

There is a scarcity of literature on empirical analysis of China's OFDI on the economic growth of V4. Therefore, limited empirical literature is collected in this study. This dissertation is filling the gap by applying econometric models to empirical estimate whether there is a significant and positive effect of China's OFDI on the economic growth of V4.

Chapter 3. METHODOLOGY

3.1 Research plan

The research is conducted by identifying the research problem of whether China's OFDI has a significant effect on the economic growth of V4. An introduction of the background on the economic cooperation between China and V4 gives the impetus to formulate the research questions and state the research objectives. The author has collected massive literature of FDI theories, economic growth theories, and empirical studies of the nexus of FDI and economic growth. It finds out it's significant and valuable to evaluate the effect of China's investment on V4's economic growth. The gap in the literature is there is a scarcity of applying quantitative methods in studying the nexus of China's OFDI on V4's economic growth. Therefore, the goal of the study is to examine the relationship between China's OFDI and V4's economic growth over the time from 2004 to 2020 using quantitative methods. Theoretical framework and empirical framework are conducted to choose the appropriate theory and models. The dissertation is based on the theoretical framework of the Solow growth model, utilizing Panel data regression, Markov-Switching Dynamic Regression (MSDR) model, Principal Component model (PCA) and Cross-Sectional Autoregressive Distributed Lag (CS-ARDL) model to analyse the research questions. The literature and theoretical framework provide a strong support in choosing the most suitable dependent and independent variables. To collect data of the chosen variables, it is highly important to evaluate the data source. The accountable source can be found as OECD, Penn World Table, and Fitch Connect in this dissertation. The empirical analysis comes after data collection and process and utilizes the above-mentioned econometric models. Post-estimation has been done to check the robustness of the models. The discussion of findings analyses and answers the research questions. In the end, the research draws the conclusion and provide policy recommendations. The future research and research limitations have been discussed as well.

The philosophical research position is of vital importance in research design, known as epistemology and ontology, which paves the way for choosing accurate methodologies. There are different philosophies in different studies. The choice of specific research philosophy comes from the practical implications. The research philosophy of my dissertation is to formulate the assumptions and hypotheses in a way in which the data of a phenomenon would be collected,

analysed, and used. The ontology and epistemology guide my research to positivism which adopts a deductive approach in a general rule (Crowther & Lancaster, 2008). Alavi and Carlson (1992) support the view that all empirical studies are in a positivist approach. The knowledge is gained by quantifiable observations that lead to statistical analyses. The fact of my study on the effect of China's OFDI on the economic growth of V4 is observable and measurable. Highly structured data will be collected and regressed to examine the causal relations and prediction as contributions. I, as the researcher of this dissertation, am detached, neutral, and independent of the research and maintain an objective stance.

3.2 Research hypotheses

This research empirically investigates the effect of China's OFDI on the economic growth of the V4 countries. The study provides the hypotheses based on the research questions. Four hypotheses are included in the study and are discussed below.

Hypothesis 1

H_1: China's OFDI has a positive and significant effect on V4's economic growth in the short and long run.

According to Solow (1957) capital stock is a source of economic growth and is expected to impact aggregate output positively. FDIs increase the capital stock of a country and if utilized efficiently and effectively they have a propensity to increase aggregate output in the long run (Borensztein et al. 1998). The literature on FDI and economic growth nexus postulate variegated findings. Some scholars find the negative effects of FDI on economic growth (Hassan, 2022). Other scholars find positive effects of the FDI on economic growth (Trojette, 2016; Nketiah-Amponsah and Sarpong, 2019). An empirical study by Curwin and Mahutga (2014) finds that inward FDIs have a positive effect on V4's economic growth in both the short and long run. Therefore, this study expects a positive effect of China's OFDI on the economic growth of the V4 countries in both the short and long run.

Hypothesis 2

H_1: China's OFDI has a positive and significant effect on V4's economic growth through productive capacities.

The effect of China's OFDI on the economic growth of the V4 countries is not complete without moderating factors that drive this relationship. Novel studies utilize at least one or more moderating factors as influencing the FDI and economic growth relationship. Most scholars postulate a positive relationship between productive capacities in the FDI and economic growth nexus (De Mello, 1999; Durham, 2004; Nayyar, 2008; and Yu et. 2019). Moderating factors influence the direction and magnitude of inward OFDIs. This research deploys productive capacities as a moderating factor. In the estimation, the productive capacities index is utilized which is a composite indicator that includes 46 indicators. Hence, this study expects a positive effect of the productive capacities index as a moderating factor.

Hypothesis 3

H_1: China's OFDI has a positive and significant effect on V4's economic growth at different economic growth states.

It is of paramount importance for policymakers and economic participants in both the host and investor countries to understand how inward FDI affects economic growth in different states of the economy. The study defines state 1 as a period of low economic growth, and state 2 as a period of high economic growth. In the literature, there are scholars that find that the effect of FDIs on economic growth is more positive and more significant in State 2 than in State 1 (Hayat et al., 2017). There is a lack of regime-switching studies on the FDI and economic growth nexus in the CEE region. However, this study expects a positive effect of China's OFDI on V4's economic growth at both low and high economic growth states.

Hypothesis 4

H_1: China's OFDI has a positive and significant effect at different quantile levels of V4's economic growth.

Different levels of economic growth are exposed to different levels of foreign capital. A country with higher levels of economic growth can possess higher levels of domestic and international investments. A study by Hsu et al. (2011) utilized Quantile Regressions and found that FDI affects economic growth more at higher percentiles and that developed countries with higher levels of absorptive capacities gain more from FDI than those with lower levels. This dissertation expects China's OFDI to have a positive effect with varying magnitudes at different percentiles of economic growth of the V4 countries.

3.3 Data collection, description, and justification

The study is utilizing secondary data that has been released in the well-known databases. This chapter is going to introduce the data sources, description, and usage. More importantly, the chosen variables will be justified within the research scope.

3.3.1. Data collection and description

This study utilized annual data with a sample period ranging from 2004 to 2020. ***Table 1*** provides abbreviations, definitions, and source of the data. ***Table 2*** provides a summary of the data. Listed in the tables are the dependent and independent variables. The dependent variable is Real GDP growth. The independent variables have been chosen astutely from the determinants of economic growth from the mainstream economics literatures.

The dissertation utilizes annual data with a sample period ranging from 2004 to 2020. ***Table 1*** provides abbreviations, definitions, and source of the data. The dependent variable is Real GDP growth of V4, and the main independent variable is Chinese OFDI in V4 in percentage of total FDI in V4. In the context of open economies, FDIs are key drivers of economic growth in the V4 countries. Before the 2008 global financial crisis, the V4 countries experienced a significant inflow of FDIs because of their favourable economic environment (Fifeková and Nemcová, 2015). It's worth including the World OFDI to V4 in percentage of GDP as an independent variable, so this study can reveal how significant that China's OFDI plays a role in V4's economic growth. Though this research is not focusing on comparative analysis, it still includes

Germany and USA OFDI to the V4 in percentage total FDI as their share of OFDIs are higher in the region (Lipsey, 2000). The other control variables have been chosen astutely from the determinants of economic growth from the mainstream economics literatures. Productive capacity is added as a key moderating factor in the relationship of China's FDI and V4's GDP growth. The use of a single indicator as proxy of productive capacity is limiting to the empirical contribution of FDI and growth nexus. Therefore, this study utilizes productive capacities index as it includes a comprehensive set of indicators.

The data sources are from Fitch Connect, OECD, World Bank, Penn World Table and UNCTADstat. Fitch Connect is available throughout universities and other platforms, providing access to in-depth research and data on markets and industry covering more than 20 industries and 200 global markets. It also offers historical macroeconomic and industry data, economic and political risk analysis, and forecasts. In this research, real GDP growth, savings, population, producer prices inflation are collected from Fitch Connect.

World Bank, OECD and UNCTADstat make the data more available and accessible, in which World Bank provides enormous open datasets, tables and reports; OECD is one of the world's largest and most reliable sources of comparable statistical, economic, and social data; UNCTADstat offers the access to more than 150 indicators and statistical time series all almost all economies of the world.

Penn World Table (PWT) is also an important data source in this research. Complied at the University of Pennsylvania, Penn World Table is considered a reliable source of international data on income and other variables that are used by numerous scholars, students, practitioners, and government offices throughout the world, and it includes income-related measures that are usually reported in national accounts statistics (Ram & Ural, 2014).

Table 1. Description of Variables

Variable	Definition	Source
	Dependent Variable	
gdp	Real gross domestic product growth	Fitch Connect
	Independent Variable	
fdi	China's OFDI, % of Total FDI	OECD

gfi	Germany's OFDI, % of Total FDI	OECD
ufi	USA's OFDI, % of Total FDI	OECD
wfdi	World's OFDI, % of GDP	World Bank
pci	Productive capacities index	UNCTADstat
tfp	Total factor productivity index	Penn World Table
fcap	Fixed capital formation, % of GDP	Fitch Connect
tro	Trade openness, % of GDP	Penn World Table
sav	Savings, % of GDP	Fitch Connect
popgr	Population, % chg y-o-y	Fitch Connect
ppi	Producer prices inflation, ave, % chg y-o-y	Fitch Connect
vol	Volatility, Standard deviation of GDP growth (%)	Own construct, Fitch Connect
y2008	2008 Global Financial Crisis, Dummy: 1=Crisis; 0=No Crisis	Own construct

Source: Author's construction.

Table 2. Summary of statistics, 2004-2020

Variable	***Obs.***	***Mean***	***Std. Dev.***	***Min***	***Max***
gdp	68	2.8558	3.3352	-6.6	10.8
fdi	68	.3823	.3313	.031	1.231
gfi	68	16.7478	6.9454	4.003	29.045
ufi	68	6.844	4.7647	.111	18.686
wfdi	68	7.45672	18.48508	-40.0863	106.594
pci	68	55.80409	3.998837	46.5269	61.1662
tfp	68	.6824	.1026	.5333	.8865
fcap	68	22.9625	3.2351	17.57	29.93
tro	68	128.003	29.4430	69.4462	168.2428
sav	68	45.2201	24.4734	10.07	82.74
popgr	68	-1.15	.1722	-.34	.41
ppi	68	1.8887	2.8390	-6.52	7.92
vol	68	3.3381	.5951	0	4.2436
y2008	68	.0588	.2370	0	1

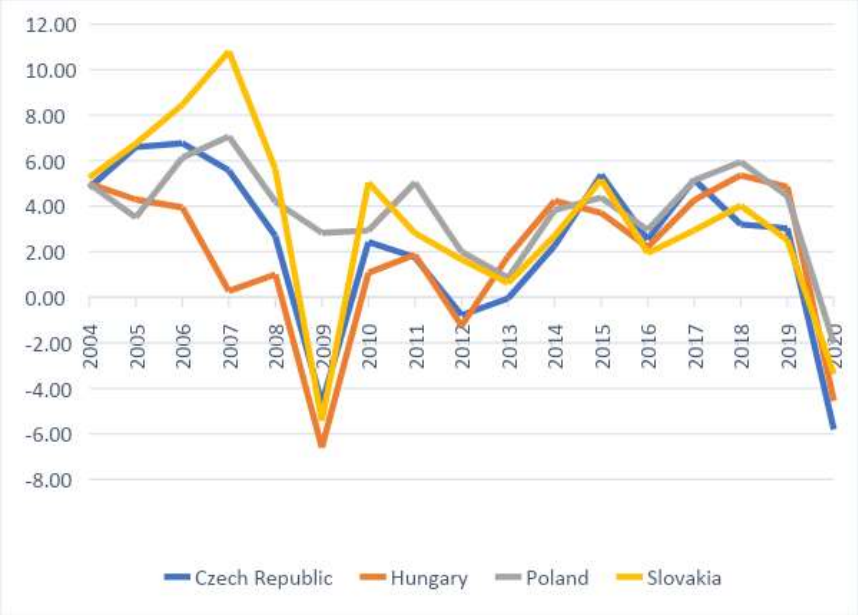
Note: Obs. = number of observations; Std. Dev. = standard deviation; Min = minimum; Max = maximum

3.3.2 Justification of variables

I. Real GDP growth (%)

In this study, real GDP growth is the dependent variable of interest that is being measured. Real GDP growth is the annual percentage change, year-on-year, of a country's GDP in constant prices. Comprehensively, real GDP growth refers to the percentage change in the inflation-adjusted Gross Domestic Product (GDP) of a country over a specific period. It measures the rate of economic growth or contraction after accounting for the effects of price changes. Real GDP growth provides insights into an economy's overall production and output performance. ***Figure 2*** depicts that real GDP growth has been adversely affected by exogenous shocks, that is, the 2008 global financial crisis and the covid-19 pandemic. These two shocks plunged real GDP growth into negative rates before their recoveries. On average, Hungary's growth rate is 1.85%, Czech Republic is 2.41%, Poland is 3.78%, and Slovakia is 3.38% in the sample period 2004 to 2020. That is, on average, the V4 countries as group experienced real GDP growth of 2.86%.

Figure 2. Real GDP growth, 2004-2020



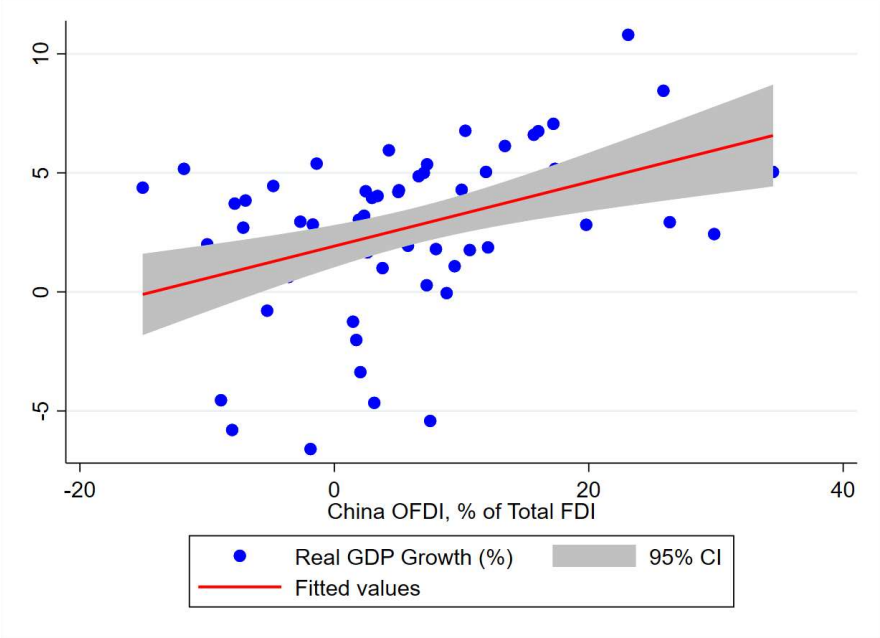
Source: Author's construction. Data from Fitch Connect.

The effect of FDI on economic growth is variegated. In some countries, foreign investment contributes more effectively than domestic investment (Kornecki and Raghavan, 2011). Other scholars find that there is a positive correlation between FDI and economic growth (Encinas-Ferrer and Villegas-Zermeño, 2015). This study also finds that China's FDI is positively correlated with V4's real GDP growth from ***Figure 3***.

II. China's OFDI in V4, % of Total FDI

China's outward foreign direct investment in V4 is the main independent variable of interest for this study. Gubik et al. (2020) postulate that China's OFDI has the potential to contribute to long run economic growth of the V4. This research is using China's OFDI in V4 in the percentage of total FDI. Inward Foreign Direct Investment (FDI) stocks by partner country measure the total level of direct investment in the reporting economy at the end of the year, by source countries (OECD, 2023). It is the value of equity in, and net loans received by enterprises resident in the reporting economy from foreign investors resident in the source country.

Figure 3. China's OFDI and Real GDP growth, 2004-2020



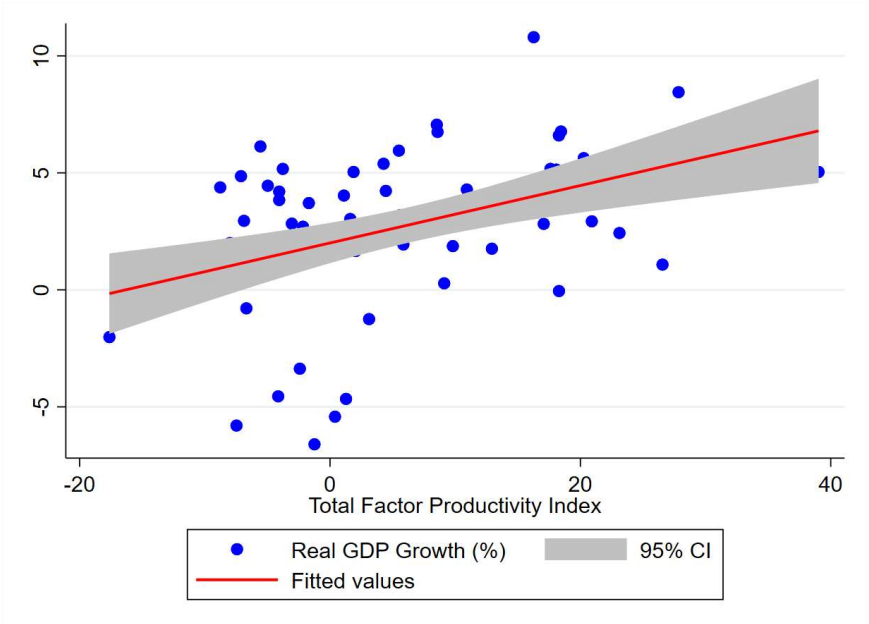
Source: Author's construction. Data from OECD and Fitch Connect.

FDI is an important component of economic integration because it creates lasting investment. These investments have a high propensity to create long-term employment, improve living standards, increase trade, and increase the economic growth of the host country (Borensztein et al., 1998; Curwin and Mahutga, 2014; Eregha, 2015; Dar et al., 2016; Ayenew, 2022). Other scholars find that FDI inflows are positive for higher threshold levels and negative for lower levels thresholds (Asafo-Agyei and Kodongo, 2022). This means it is beneficial for a country to have a high investment in the form of FDI. ***Figure 3*** depicts that an increase in real GDP growth is associated with an increase in China's OFDI in the V4 countries.

III. Total Factor Productivity Index (Using National Accounts, 2017=1)

Total factor productivity (TFP) index is computed with GDP (using national accounts growth rates), Capital stock (using national accounts), labour input data and share of labour compensation in GDP, the share of labour income of employees and self-employed workers in GDP. It is useful to compare the growth of productivity over time in each country. Total factor productivity is the component of productivity that proxies technological progress and organizational innovation.

Figure 4. Total Factor Productivity Index and Real GDP growth, 2004-2020



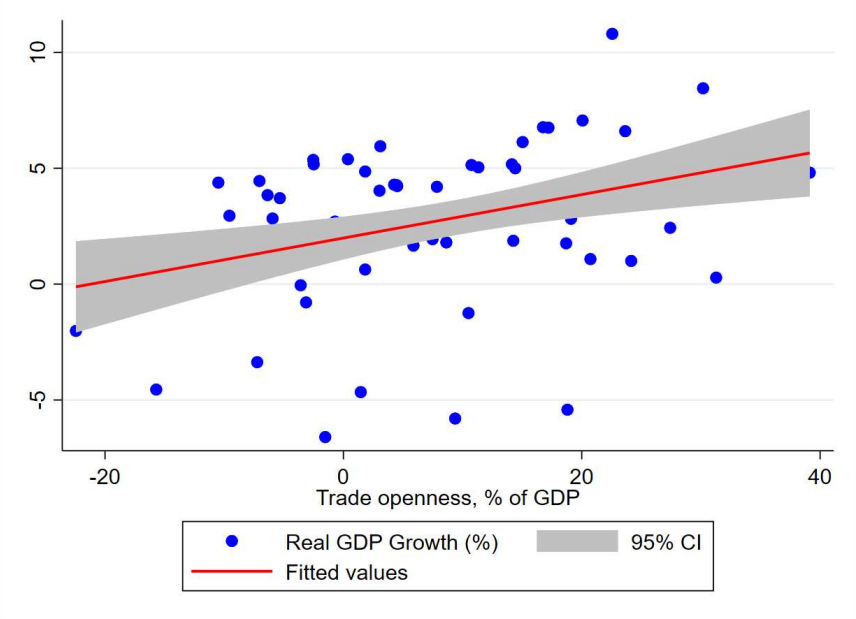
Source: Author's construction. Data from Penn World Table and Fitch Connect.

According to Levenko et al. (2018) TFP was a key contributor to economic growth in CEE countries from a sample period 1996 to 2016. In Hungary, Slovenia, and Slovakia, TFP was the main contributor to growth before the 2008 global financial crisis. ***Figure 4*** depicts that an increase in real GDP growth is associated with an increase in TFP in the V4 countries. This research expects that an increase in TFP is associated with higher GDP growth. When a country experiences improvements in technology, innovation, and productivity, it can produce more output with the same number of inputs or use fewer inputs to produce the same output. This leads to economic growth as more goods and services are produced and available for consumption and investment.

IV. Trade openness, % of GDP

According to Feenstra et al. (2015) trade openness is measured as the sum of a country's exports and imports as a share of that country's GDP (in %). It is defined as the sum of exports and imports divided by the GDP at current prices. According to Mehic et al. (2013) trade openness has a significant impact on economic growth and serve as a determinant of GDP. Trade openness allows domestic firms to access larger markets and international customers. By exporting goods and services to foreign markets, firms can increase their sales and revenue, leading to higher economic growth. A study by Curwin and Mahutga (2014) found that trade openness decreased economic growth as measured by GDP per capita. However, this study utilizes the real GDP growth rate which provides a meaningful statistical about where the macroeconomy is headed. ***Figure 5*** depicts that an increase in real GDP growth is associated with an increase in trade openness in the V4 countries.

Figure 5. Trade openness and Real GDP growth, 2004-2020

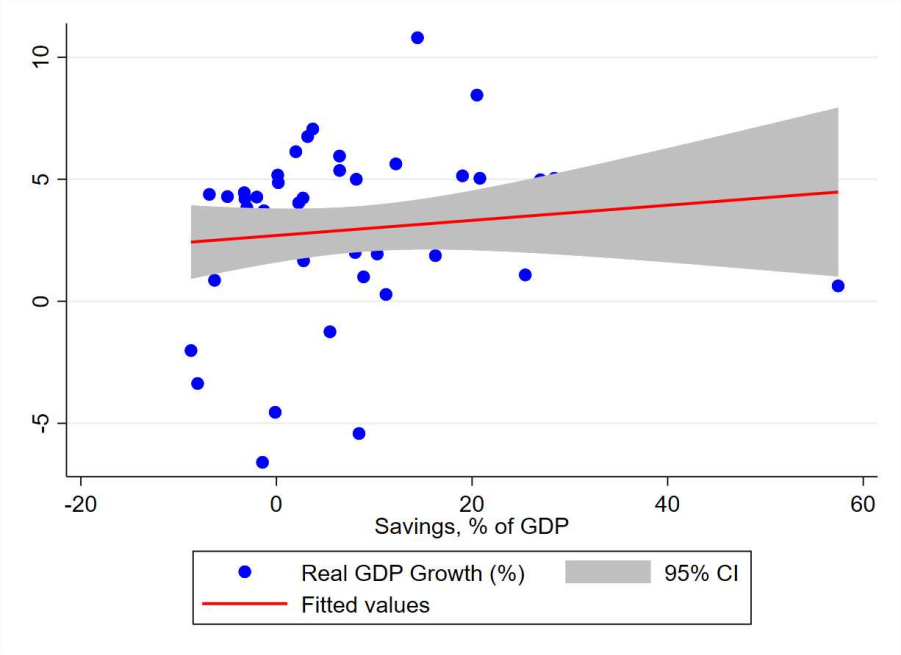


Source: Author's construction. Data from Penn World Table and Fitch Connect.

V. Savings, % of GDP

Gross national savings represents the domestic level of savings by individuals, businesses and government combined, as percentage of GDP. When individuals and businesses save, these funds can be channelled into productive investments, such as infrastructure development, new technologies, and expansion of businesses. Increased investment, in turn, contributes to economic growth by increasing production and productivity. Domestic savings in the economy is a source of investment that accelerates economic growth (De Carvalho, 2012). Countries with lower levels of savings have low domestic capital to finance profitable investment projects. Countries with high levels of savings have the domestic capital to finance growth (Borensztein, 1992). ***Figure 6*** depicts that real GDP growth is associated with savings. However, the association is weak and hence other latent factors may have influenced this relationship. Adequate levels of savings in an economy contribute to economic stability. A higher savings rate provides a buffer during times of economic downturns and financial crises, as it allows individuals and businesses to draw on their savings to maintain consumption and investment levels (Carroll et al., 1992). This makes savings an important determinant of economic growth.

Figure 6. Savings and Real GDP growth, 2004-2020



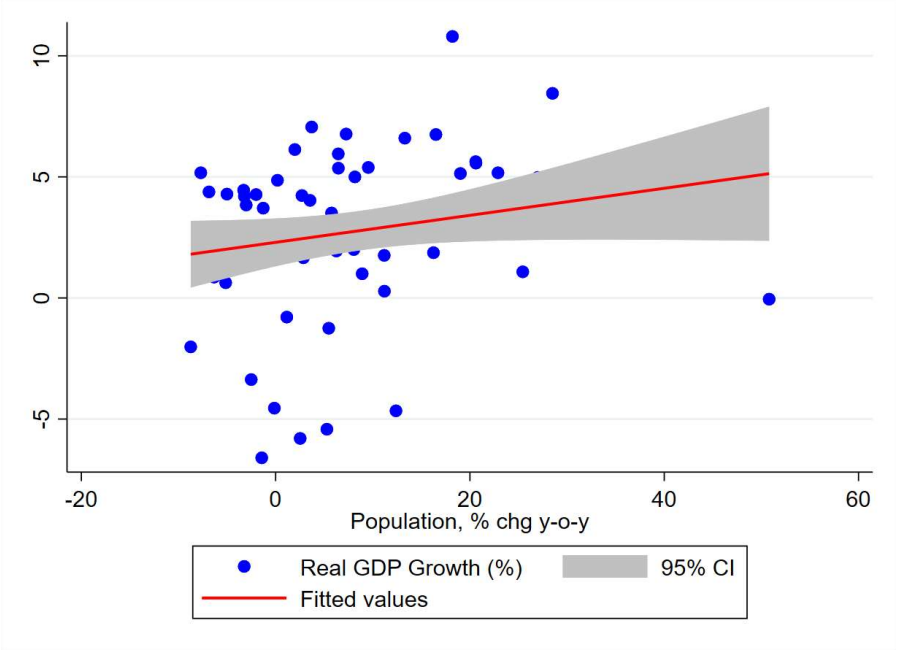
Source: Author's construction. Data from Fitch Connect.

VI. Population, % chg y-o-y

Population is the sum of all residents within a defined country regardless of legal status or citizenship. The treatment of country and provincial borders is defined by the UN Population Division, and where a national statistics office is accredited as a source, then it is defined by that body. There is a strong link between population and economic growth. The size of the population affects the economic growth of developed and developing countries differently (Wongboonsin and Phiromswad, 2017). An increase in the middle-aged population increases economic growth in developed countries, and an increase in the senior population affects economic growth negatively. In developing countries, the results are not significant but postulate that an increase in young workers has a negative effect. According to Jones (1997), an increase in endogenous fertility with increasing returns necessitates endogenous economic growth. Peterson (2017) postulates that a decrease in population in high-income nations reduces economic growth, and an increase in population in low-income nations reduces economic growth. This study finds there is a high and positive correlation between real GDP and population. The study by Curwin and Mahutga (2014) for post-Socialist transition countries

finds that population have a positive and insignificant effect on economic growth. The fuzzy association in ***Figure 7*** reflects that the relationship of China's OFDI and V4's economic growth nexus may depend on latent factors.

Figure 7. Population and Real GDP growth, 2004-2020



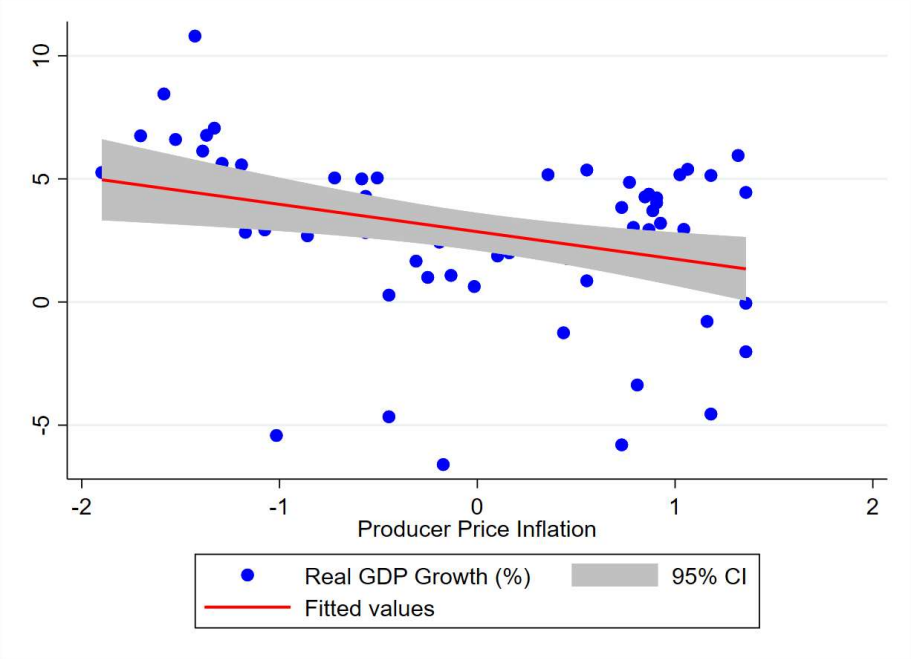
Source: Author's construction. Data from Fitch Connect.

VII. Producer prices inflation, % chg y-o-y

Producer Price Index (PPI) measures and changes in the total cost of a basket of goods and services commonly purchased by producers. A significantly high PPI may lead to cost-push inflation. This means that producers are facing higher input, and they may pass these increased costs onto consumers by raising the prices of their goods and services. Inflation can erode purchasing power, reduce consumer spending, and potentially impact GDP growth negatively (Clark, 1995). High and persistent PPI inflation can influence inflation expectations among consumers and businesses. When people expect prices to rise in the future, they may change their spending and investment behaviours, which can impact economic activity and GDP growth. ***Figure 8*** depicts that the association between PPI and real GDP growth is negative in the V4 countries. PPI can influence inflationary pressures, profit margins, investment decisions,

and overall economic activity. Policymakers and analysts closely monitor PPI along with other economic indicators to assess the health of the economy and make informed decisions to promote sustainable and stable economic growth.

Figure 8. Producer Price Inflation and Real GDP growth, 2004-2020



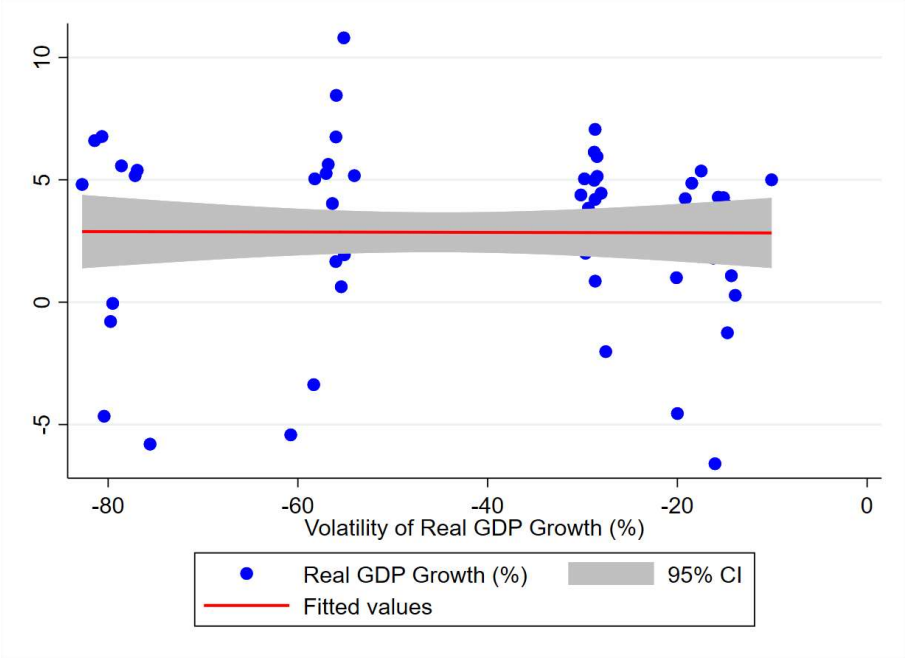
Source: Author's construction. Data from Fitch Connect.

VIII. Volatility, Standard Deviation of real GDP growth

Macroeconomic volatility refers to the degree of fluctuation in GDP growth over a specific period (Wolf, 2005). It represents the instability or changes in GDP growth and is an important aspect of analysing and understanding the overall economic conditions. The formula for calculating GDP volatility is its Standard Deviation. An empirical study by Wolf (2005) finds a negative association and effect of volatility on GDP growth by considering high, middle, and low-income countries from 1960 to 2000. A study by Aghion et al. (2010) finds that GDP volatility has a negative and significant effect on economic growth in 21 OECD countries from 1960 to 2000. Onyimadu, C. (2016) finds that GDP volatility has positive effect on economic growth in 40 African countries from 1980 to 2014. ***Figure 9*** depicts that the association between

volatility and real GDP growth is weak. This is what can be expected from volatility as an indicator of uncertainty. It is important to note that volatility itself does not necessarily imply positive or negative outcomes. Volatility can be a natural characteristic of the economic system. In some cases, higher volatility can create opportunities for gains and market efficiency. However, prolonged volatility can also be indicative of underlying problems in the economy, warranting attention and appropriate measures by policymakers. Volatility is one of the indicators that analysts and policymakers consider when assessing the level of uncertainty in the macroeconomy. It serves as a gauge of market sentiment and can provide insights into potential risks and challenges ahead.

Figure 9. Volatility and Real GDP growth, 2004-2020

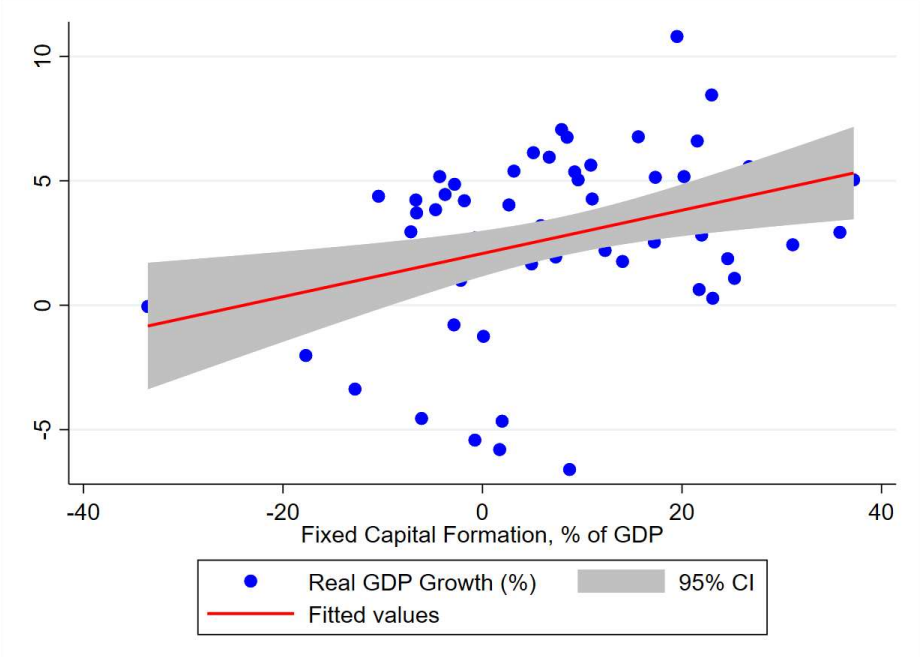


Source: Author's construction. GDP data from Fitch Connect. Own calculations of Volatility.

IX. Fixed Capital Formation, % of GDP

The nexus between fixed capital formation and GDP growth is an essential aspect of understanding how investment in physical assets influences an economy's overall output and economic performance. Fixed capital formation refers to the increase in physical assets such as machinery, equipment, infrastructure, and buildings that are used in the production process. Fixed capital formation and GDP growth are closely interconnected. A study by Gibescu (2010) finds that fixed capital formation has positive and significant effect in Romania, Bulgaria, Czech Republic, Poland, and Hungary for the period 2003 to 2009. Higher levels of investment in physical assets can drive economic expansion, create jobs, increase productivity, and contribute to sustained and inclusive economic growth (Blomström et al., 1996). It is crucial for policymakers and businesses to recognize the importance of fixed capital formation and implement strategies that foster an environment conducive to increased investment, innovation, and technological progress. ***Figure 10*** depicts that real GDP growth is associated with an increase fixed capital formation in the V4 countries.

Figure 10. Fixed Capital Formation and Real GDP growth, 2004-2020



Source: Author's construction. Data from Fitch Connect.

X. 2008 Global Financial Crisis, Dummy: 1=Crisis; 0=No Crisis

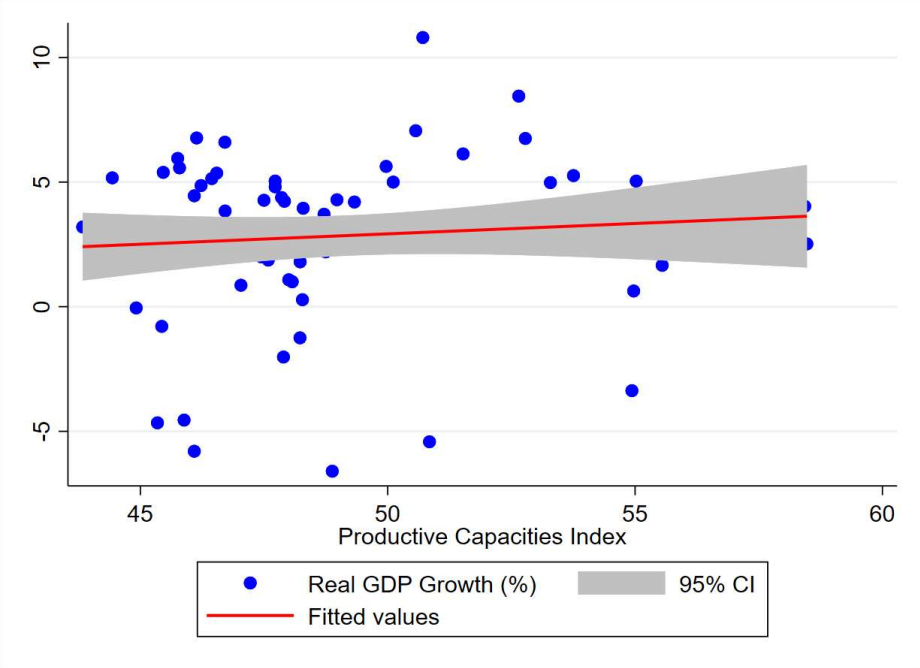
The 2008 Global Financial Crisis, often referred to as the "Great Recession," was a severe worldwide economic downturn that originated in the United States and had significant repercussions globally. It was one of the most significant financial crises since the Great Depression of the 1930s. The 2008 global financial crisis had a significant impact on the GDP growth of the V4 group of countries. While the specific effects varied among these countries due to differences in their economic structures and policy responses, overall, the crisis led to a sharp slowdown in economic growth in the region. To create a dummy variable for the 2008 Global Financial Crisis, this study assigns the value of 1 to observations that fall within the crisis period and assign the value of 0 to observations outside the crisis period. A study by Dornean et al. (2012) finds that the 2008 global financial crisis had a negative and significant effect on both FDIs and economic growth in CEE countries. Despite the challenges posed by the global financial crisis, the V4 countries demonstrated resilience and gradually recovered from the downturn. Over time, as the global economic situation improved and the countries implemented various reforms, they experienced a rebound in GDP growth. The V4 countries' integration with the EU and their strong economic fundamentals played a crucial role in their ability to recover from the crisis and resume the growth trajectories.

XI. Productive Capacities Index

The Productive Capacities Index (PCI) is an economic indicator that measures a country's ability to produce goods and services efficiently and effectively (UNCTAD, 2021). It assesses the overall capacity of an economy to utilize its available resources. The PCI is a composite indicator that combines various data and sub-indices related to these factors to provide a comprehensive assessment of an economy's production capabilities. It helps investors, policymakers, and analysts identify areas of strength and weakness in an economy's production capacity, enabling them to formulate targeted strategies to enhance productivity, competitiveness, and overall economic performance (De Mello, 1999). The PCI can be used to compare the productive capacities of different countries, track changes over time, and inform policy decisions related to economic development, investment priorities, and structural reforms. By focusing on strengthening productive capacities, countries can improve their ability to meet domestic needs, increase exports, and achieve sustainable and inclusive economic growth (Gnangnon, 2021). The association of PCI and real GDP growth may not be well understood

as it reflects a weak correlation. This association can be depicted by a fuzzy scatterplot in ***Figure 11***. However, this study utilizes PCI to interact it with OFDIs in the study to create an interaction term. Thus, the effect of OFDI on real GDP growth will depend on PCI.

Figure 11. PCI and Real GDP growth, 2004-2020



Source: Author's construction. Data from Fitch Connect.

3.2 Theoretical framework: Augmented Solow Growth Model

The point of departure is from the Solow growth model which is utilizing to understand the sources of economic growth in the long run. This is a vanilla framework that help economics scholars identify causes of growth and their process. The Solow model, also known as the neoclassical growth model, is one of the most widely used frameworks for understanding economic growth. It was developed by Robert Solow in the 1950s and 1960s and has been influential in shaping the field of macroeconomics. Economists continue to debate and refine growth frameworks, seeking to improve understanding of economic growth and inform policy decisions. Therefore, this theoretical framework is to understand how FDI is incorporated in the model.

The framework that has been adopted is the augmented Solow growth model which is a Dynamic General Equilibrium (DGE) model. FDI is a foreign capital that is an addition to the domestic capital. There are no major differences in how foreign capital and domestic capital affect economic growth. Endogenous growth models postulate that FDI can exerts a permanent effect on economic growth (Romer, 1990). In the Solow model, FDI increase domestic capital by affecting output. According to Hanson (2001) the complementary composition of foreign capital, FDI, and domestic capital creates a final impact of economic growth that is larger than deploying domestic capital alone. When foreign companies invest in the domestic market, they bring in funds to establish or expand their operations. This investment can lead to the creation of new factories, offices, and infrastructure, which increases the overall stock of physical capital in the host country (Felipe, 1999).

The framework utilizes the Cobb-Douglas production function which states that total production is function of labour inputs, capital inputs, and total factor productivity (Cobb and Douglas, 1928). The contribution by Solow (1957) were able to decompose the determinants of economic growth and make use of growth accounting which can explain to us by how much of a country's economic growth can be explained by its determinants. ***Equation 2*** states the general form of the aggregate production function used by the Solow model. It has been realised that this is a very parsimonious framework that should be expanded to include other sources of growth. In response to this limitation, Mankiw, Romer, and Weil (1992) added human capital in the framework to account for the aggregate contributions of education, skills, and work experience of the employed people. The expanded version of ***Equation 2*** is depicted by ***Equation 3***.

$$Y(t) = K(t)^{\alpha}[A(t)L(t)]^{1-\alpha} \ , \qquad 0 < \alpha < 1 \tag{2}$$

$$Y(t) = K(t)^{\alpha}H(t)^{\beta}[A(t)L(t)]^{1-\alpha-\beta} \ , \qquad 0 < \alpha, \beta < 1, \qquad \alpha + \beta < 1 \tag{3}$$

, where Y is economic growth, K is capital, H is human capital, A is the level of technology, L is the labour force, α is the elasticity of economic growth with respect to physical capital, and β is the elasticity of economic growth with respect to human capital. Therefore, ***Equation 3*** culminates with two forms of capital: physical, and human capital. The physical capital is a sum of domestic and foreign capital. From the logic applied by Mankiw, Romer, and Weil (1992),

this research shows that Solow model is concerned with the effect of these two capitals on real economic growth. ***Equation 4*** explains the steady-state output per effective labour, $\frac{Y_t}{L_t}$.

$$ln\ ln\left[\frac{Y_t}{L_t}\right] = lnA_o + gt - \left(\frac{\alpha+\beta}{1-\alpha-\beta}\right) ln\ ln\,(n+g+\delta) + \left(\frac{1}{1-\alpha-\beta}\right)[\alpha lnS_K + \beta lnS_H] \quad (4)$$

, where δ is the common rate of depreciation of the capitals, n is the labour growth, g is the growth in technology, $\alpha + \beta$ is the share of capital in economic growth, and *ln* is the logarithm. Labour, *L(t)*, is assumed to grow exogenously at rate of n. Technology, *A(t)*, is assumed to grow exogenously at rate g. Technology is $lnA_o = a_0 + \mu$, where a_0 is a constant and μ is the country-specific shock. The capital stock depreciates at rate δ. The accumulation of physical capital is denoted by S_K, and human capital is denoted by S_H. The estimation of output per effective labour can be illustrated by ***Equation 5***.

$$\hat{Y}(t) = k^{\alpha}(t) + h^{\beta}(t) \quad (5)$$

In the long run, the Solow model assume the output per effective labour reach a steady state and can be illustrated by ***Equation 6***. It shows that the relative contributions of physical and human capital on output depends on the shares of these two capitals. The larger α the more FDI and domestic capital becomes important, and the larger β the more human capital becomes important.

$$\hat{Y}(t) = \left(\frac{S_k}{n+g+\delta_k}\right)^{\frac{\alpha}{1-\alpha-\beta}} \left(\frac{S_h}{n+g+\delta_F}\right)^{\frac{\beta}{1-\alpha-\beta}} \quad (6)$$

This study can obtain a balanced growth path of output for country *j = 1, ..., N* by a linear equation which takes logs illustrated by ***Equation 7***. Similarly, to the mechanics of Mankiw, Romer, and Weil (1992) this research assumes that countries differ in terms of their initial level of technology, $\underline{A}_j$, but can commonly share the same technology growth rate, g.

$$ln\underline{Y_j}(t) = ln\underline{A}_j + gt + \frac{\alpha}{1-\alpha-\beta} ln\left(\frac{S_{k,j}}{n_j + g + \delta_k}\right) + \frac{\beta}{1-\alpha-\beta} ln\left(\frac{S_{h,j}}{n_j + g + \delta_h}\right) \quad (7)$$

According to Barro and Sala-i-Martin (1992) the Solow growth model enables scholars to predict the speed of convergence to the steady-state level of output. The speed of convergence can be explained by ***Equation 8***.

$$\frac{\partial lnY_t}{\partial t} = \lambda[lnY^* - lnY_t], \quad \lambda = (n + g + \delta)(1 - \alpha - \beta) \quad (8)$$

, where Y is the level of output per effective worker, Y^* is the level of output per effective worker at the steady state, is the speed of convergence of the specific-country's economy. Therefore, ***Equation 9*** explain the speed of convergence to the steady state.

$$ln\, ln\,[Y_t - Y_0] = (1 - e^{-\lambda t})\frac{\alpha}{1-\alpha-\beta} lnS_k + (1 - e^{-\lambda t})\frac{\beta}{1-\alpha-\beta} lnS_h - (1 - e^{-\lambda t})\frac{\alpha+\beta}{1-\alpha-\beta} ln\,(n + g + \delta) - (1 - e^{-\lambda t}) lnY_0 \quad (9)$$

Equation 9 can be estimated with by ***Equation 10***.

$$ln\, ln\,[Y_t - Y_0] = a_0 + a_1 lnS_k + a_2 lnS_h + a_4\, ln\, ln\,(n + g + \delta) + a_5 lnY_0 + \mu \quad (10)$$

Equation 10 explains that output growth per effective labour depends on the physical capital, and human capital. According to Mankiw, Romer, and Weil (1992) convergence to a higher level of output growth per effective labour can be achieved if a country utilizes its capital efficiently. Therefore, developing appropriate FDI policies can accelerate economic growth. The augmented Solow model enriches economic growth studies by implicitly incorporating FDI into the traditional Solow model framework. By doing so, it allows us to analyse the role of FDI in shaping economic growth and understand the mechanisms through which financial factors interact with other determinants of growth.

According to Romer (1990) FDI have high propensity to increase physical and human capital, as well as research and development which increases innovations. An increase in innovation and competitiveness can accelerate technology and productivity and affect economic growth positively (Grossman and Helpman, 1991). In their empirical study, Li and Tanna (2018) found that FDIs can affect economic growth by affecting total factor productivity (TFP) which depends on technology and its efficiency in the host country. They also find that the gains from FDIs are more explained by institutions than TFP growth. According to Rakshit (2022) trade openness of the host country can create an enabling environment for greater FDIs if there is a strong export-orientation. If this condition does not hold, trade openness can have a negative impact in the long run.

The augmented Solow model provides insights into the role of capital accumulation and resource allocation. The model also provides a framework to analyse the impact of FDI, which is part of physical capital, and its policies on economic growth. It allows us to explore how improvements in attracting foreign capital can affect long-term growth. This framework can be used to inform policymakers about the potential benefits of promoting FDI and implementing appropriate policies to support economic growth. Besides, the augmented Solow model enables to study of how financial crises and disruptions can impact long-term growth. It captures the negative effects of financial crises which can have lasting consequences for economic performance. The augmented Solow model provides a more comprehensive framework to analyse the interplay between FDI and economic growth.

3.3 Empirical framework

3.3.1 Panel Data Modelling

Building upon the theoretical framework of the augmented Solow growth model, this research is applying empirical models to examine the relationship between China's OFDI and V4's economic growth. Panel data econometrics are utilized to analyse how much economic growth can be explained by China's OFDI. All the variables in the model have data availability and making the panel balanced. Panel data analysis is conducted based on necessary steps as scientifically demonstrated by Angrist and Pischke (2009). The panel data method provides

advantages in which several countries can be regarded as a group, and it can generate representative estimates.

The linear panel data models applied in this dissertation include Feasible Generalized Least Squares (FGLS), Pooled Ordinary Least Squares (POLS), Fixed Effects (FE), and Random Effects (RE). According to the theoretical and empirical literature, this research estimates ***Equation 11***, which reflects the general representation the model. That is, GDP is a function of China's OFDI and control variables.

$$GDP = f(OFDI, Control\ Variables) \tag{11}$$

The *Feasible Generalized Least Squares* (FGLS) is a statistical technique used to estimate panel data models that account for both within-group and between-group variations in the data. In panel data analysis, V4 countries are observed as a group over multiple time periods. According to Bai et al. (2021), FGLS considers the correlation of the error term within each entity over time and the heteroscedasticity of the error term across countries. The FGLS model assumes that the variance-covariance matrix of the errors is not constant across countries and time periods. Instead, it allows for the possibility that the variances and covariances of the errors may vary across countries and over time. This is achieved by weighting the observations in the panel data based on the estimated variances and covariances of the error terms. Bai et al. (2021) postulate that the FGLS model is particularly useful when the assumption of homoscedasticity and independence of the error term is violated in panel data. It provides more efficient estimates of the coefficients than the standard OLS method, which assumes homoscedasticity and independence of the error term. Therefore, the FGLS model is a powerful tool for analysing panel data and can provide more accurate estimates of the effects of the variables of interest, especially when the errors are correlated and heteroscedastic. ***Equation 12*** captures the econometric specification of the FGLS model.

$$FGLS:\ GDP_{i,t} = \sum_{i=1}^{N} \beta_1 OFDI_{i,t} + \sum_{i=1}^{N} \beta_2 X_{i,t} + \varepsilon_{i,t}\ ;\quad t = 1, \dots T; i = 1, \dots N \tag{12}$$

, where $GDP_{i,t}$ is the GDP growth for country *i* at time *t*; $OFDI_{i,t}$ represent a vector of Foreign Direct Investment; $X_{i,t}$ represent a vector of control variables; $\varepsilon_{i,t}$ is the error term.

The *Pooled Ordinary Least Squares* (POLS) is a simple panel data estimation technique that assumes that the coefficients of the explanatory variables are the same across all countries and time periods. The POLS model pools all the observations across countries and time periods and estimates the coefficients using the standard OLS method. According to Wooldridge (2012) this approach is appropriate when there is no significant variation in the effects of the independent variables across different entities and time periods. However, if there are significant differences in the relationships between the dependent and independent variables across entities and time periods, the POLS model may lead to biased and inefficient estimates. The advantage of the POLS model is that it is simple to estimate and interpret, and it provides a baseline for comparison with more sophisticated panel data estimation techniques. However, the main disadvantage is that it assumes that the coefficients of the independent variables are the same across all countries and time periods, which may not be realistic in other cases. ***Equation 13*** captures the econometric specification of the POLS model.

$$POLS: \quad GDP_{i,t} = \sum_{i=1}^{N} \beta_1 OFDI_{i,t} + \sum_{i=1}^{N} \beta_2 X_{i,t} + v_{i,t} \; ; \quad t = 1, \dots T; i = 1, \dots N \qquad (13)$$

, where $GDP_{i,t}$ is the GDP growth for country *i* at time *t*; $OFDI_{i,t}$ represent a vector of Foreign Direct Investment; $X_{i,t}$ represent a vector of control variables; $v_{i,t}$ is the error term.

The *Fixed Effects* (FE) model is a panel data estimation technique, allowing for individual-specific effects that are constant over time. It is used to account for unobserved heterogeneity across different countries in a panel dataset. According to Hausman and Taylor (1981) the fixed effects model assumes that the coefficients of the independent variables are the same for all countries but allows for country-specific intercepts that capture the unobserved heterogeneity. The fixed effects model estimates the coefficients of the independent variables using the differences within each country over time. By subtracting the country-specific mean from each observation, the fixed effects model removes the country-specific unobserved heterogeneity from the estimation. According to Hausman and Taylor (1981) this approach is appropriate

when the focus is on the relationships between the independent variables and the dependent variable within each country, rather than the differences across individuals. ***Equation 14*** captures the econometric specification of the *FE* model.

$$FE: \quad GDP_{i,t} = \sum_{i=1}^{N} \beta_1 OFDI_{i,t} + \sum_{i=1}^{N} \beta_2 X_{i,t} + \alpha_i + \varepsilon_{i,t} \; ; \quad t = 1, \dots T; i = 1, \dots N \qquad (14)$$

, where $GDP_{i,t}$ is the GDP growth for country *i* at time *t*; $OFDI_{i,t}$ represent a vector of Foreign Direct Investment; $X_{i,t}$ represent a vector of control variables; $\varepsilon_{i,t}$ is the error term; and α_i is the country-specific intercept that captures the unobserved heterogeneity.

The *Random Effects* (RE) model is a panel data estimation technique that allows for unobserved heterogeneity across individuals that are random and uncorrelated with the independent variables. It is used to account for both observed and unobserved heterogeneity across individuals in a panel dataset. According to Joshi and Wooldridge (2019) the random effects model assumes that the coefficients of the independent variables are the same for all individuals but allows for individual-specific intercepts that are randomly distributed across individuals. ***Equation 15*** captures the econometric specification of the *RE* model.

$$RE: \quad GDP_{i,t} = \alpha_i + \sum_{i=1}^{N} \beta_1 OFDI_{i,t} + \sum_{i=1}^{N} \beta_2 X_{i,t} + \varepsilon_{i,t} \; ; \quad t = 1, \dots T; i = 1, \dots N \qquad (15)$$

, where $GDP_{i,t}$ is the GDP growth for country *i* at time *t*; $OFDI_{i,t}$ represent a vector of Foreign Direct Investment; $X_{i,t}$ represent a vector of control variables; $\varepsilon_{i,t}$ is the error term; and α_i is the individual-specific intercept that is randomly distributed across individuals.

3.3.2 Markov-Switching Dynamic Regression Modelling

Markov Switching Dynamic Regression (MSDR) is a statistical modelling technique used to analyse time series data where the underlying data generating process can switch between

different regimes or states (Hamilton, 1989). It combines elements of Markov models and regression analysis to capture the dynamic behaviour of the data over time. The purpose of MSDR is to provide a flexible framework for modelling complex time series data that exhibit regime switches. In many economic, financial, and social phenomena, the data generating process can change over time due to various factors such as economic cycles, policy changes, market conditions, or shifts in investor sentiment. MSDR allows for the identification and estimation of these different regimes and provides insights into the characteristics and dynamics of each regime. The key idea behind MSDR is that the observed time series data are assumed to be governed by an unobservable Markov chain, where each state represents a different regime (Goldfeld and Quandt, 1973). The transitions between states are governed by probabilities, and within each state, a regression model is used to describe the relationship between the variables of interest. The model parameters and the probabilities of switching between states are estimated using statistical techniques such as maximum likelihood estimation. By explicitly accounting for regime switches, MSDR allows for a more accurate representation of the underlying dynamics of the data. It can help identify periods of stability versus volatility, different patterns of behaviour, and relationships that vary across regimes. This model helps understand and predict changes in regimes that can be useful in decision-making and policy formulation (Hamilton, 1990). It is of paramount importance to know the effect of China's OFDI on the V4's economic growth path at different economic growth states. This study investigates this effect in periods during which the GDP of each country exhibits high and low. MSDR can model V4's economic growth, as measured by GDP growth, as a switching process to capture the heterogeneous behaviour that can be observed through expansions and recessions. V4's GDP growth is modelled as depending on China's OFDI and a set of control variables. MSDR model divides the data by two states/regimes – high and low economic growth periods. The model provides estimates separated into state 1, which is a period of low economic growth, and state 2, which is a period of high economic growth. The model identifies the regime possibilities for each observation. In each regime, the parameter estimates reveal the relationship between the dependent variable and independent variables. MSDR also estimates the transition probabilities of each state to the other and calculates the expected duration of each state. The specification of the MSDR model is denoted by ***Equation 16***.

$$GDP_t = \mu_s + \sum_{i=1}^{N} \alpha_s OFDI_{i,t} + \sum_{i=1}^{N} \beta_s X_{i,t} + \varepsilon_s \;\; ; \;\; t = 1, \dots T; i = 1, \dots N \qquad (16)$$

, where GDP_t is the GDP growth as dependent variable, μ_s is the state-dependent constant, $OFDI_{i,t}$ is the China's Outward Foreign Direct Investment variables that is state-invariant with coefficient α_s, $X_{i,t}$ is a vector of exogenous variables that are state-dependent with coefficient β_s, and ε_s is the error term.

3.3.3 Principal Component Analysis modelling

Principal Component Analysis (PCA) is used to reduce the dimensionality of a dataset while retaining the most important information. It identifies patterns and relationships in the data by transforming the original variables into a new set of uncorrelated variables called principal components. The purpose of PCA is to simplify complex datasets, improve interpretability, and extract the most relevant information. By reducing the number of variables, PCA alleviate the computational burden in subsequent analyses and mitigate issues related to multicollinearity. By transforming the variables into orthogonal components, PCA reduces the intercorrelations among the variables. This can be particularly useful in regression analysis, where multicollinearity can lead to unstable parameter estimates and difficulties in interpretation.

According to Abdi and Williams (2010), the goals of Principal Component Analysis (PCA) are to extract the most important information from the data table; compress the size of the data set by keeping only this important information; simplify the description of the data set; and analyze the structure of the observations and the variables. This means that the model can reduce the number of variables into components that help explain the dependent variables with only important information from the data. The goal is to find the components $z = [z_1, z_2, \ldots, z_p]$, which are linear combinations $u = [u_1, u_2, \ldots, u_p]$ of the original independent variables $x = [x_1, x_2, \ldots, x_p]$ that is aimed at achieving the maximum variance (Torokhti and Friedland, 2009). PCA simplifies and completes the data. Simplicity means that it retains as few variables as possible which are transformed into components. Completeness means that the derived components explain most of the variation in the data. According to Kaiser's rule, it is recommended to retain only components with eigenvalues exceeding unity (Jackson, 1993). Practically, this can be explained by the scree plot of eigenvalues. In addition to Kaiser's rule, PCA should be conducted only when there is sufficient correlation between the original

variables. This can be measured by the Kaiser-Meyer-Olkin (KMO), a measure of sampling adequacy that takes values between 0 and 1 (Kaiser, 1974). Small values of the KMO mean that the overall variables have little in common for the use of PCA, and values above 0.5 are considered satisfactory for PCA. The linear OLS regression minimizes the point between the observed (x_i,y_i) from the estimated point ($x_{i,a} + bx_i$) on the regression line $y=a+bx$ (Huang, 2023). In contrast, the PCA regression minimizes the distance of the point (x_i,y_i) to a line that is orthogonal to the regression line $y=a+bx$ (Torokhti and Friedland, 2009). The linear regression equation with PCAs can be specified by ***Equation 17***.

$$GDP_{i,t} = \beta_0 + \beta_1 PCA_{1,t} + \beta_2 PCA_{2,t} + \cdots + \beta_k PCA_{k,t} + \varepsilon_{i,t} \;\; ; \;\; t = 1, \ldots T \qquad (17)$$

, where $GDP_{i,t}$ is the growth of Gross Domestic Product and is the dependent variable; $PCA_{1,t}$, …, $PCA_{k,t}$ are the components; β_1 , …, β_k are the coefficients of the components; and $\varepsilon_{i,t}$ is the error term.

3.3.4 Cross-Sectional Autoregressive Distributed Lag Modelling

Cross-Sectional Autoregressive Distributed Lag (CS-ARDL) modelling is used to analyse relationships between variables in cross-sectional data. It extends the traditional autoregressive distributed lag (ARDL) model, which is typically applied to time series data, to handle cross-sectional data settings. The purpose of CS-ARDL modelling is to investigate the long-run and short-run relationships between variables in a cross-sectional setting, considering the potential presence of endogeneity and dynamic interactions among the variables. It allows researchers to examine how changes in independent variables impact the dependent variable over time, while also considering the potential lagged effects and interdependencies among the variables (Pesaran and Smith, 1995). The CS-ARDL model combines elements of autoregressive (AR) models, distributed lag (DL) models, and panel data analysis. It includes lagged values of the dependent and independent variables, as well as the average values of the independent variables over time, to capture both the dynamic and long-run relationships. The CS-ARDL approach helps to uncover the short-run and long-run dynamics in cross-sectional data, offering insights into causal relationships and policy implications. The model can handle both stationary and

non-stationary variables, making it suitable for analysing data with different characteristics (Pesaran, 2006).

One of the hypotheses in this research is to estimate the short-run and long-run effects between the independent and dependent variables. The study estimates it with the model specification that considers any cross-sectional dependence between variables. Cross-sectional dependence can be found when the panel data from countries under the study are correlated, which can make the coefficient estimation inconsistent (Pesaran, 2006; Chudik and Pesaran, 2015). This statistical problem can also be caused by unknown common factors that are not included in the model. If these common factors are omitted from the model, they become omitted variables, ultimately leading to omitted variable bias. To fully ensure that the study obtains consistent estimates and considers any model inefficiencies, they study applies the Cross-Sectional Autoregressive Distributed Lag (CS-ARDL) model (Pesaran and Smith, 1995). To achieve the estimation purpose, the study applies the most possible parsimonious model of the convergence model, transforming it into the CS-ARDL. The main idea of the CS-ARDL is to first estimate the short-run coefficients, and secondly estimate the long-run coefficients. The CS-ARDL model is specified by ***Equation 18***.

$$GDP_{i,t} = \sum_{i=1}^{P_{gdp}} \lambda_{I,i} GDP_{i,t-1} + \sum_{i=1}^{P_{ofdi}} \beta_{I,i} OFDI_{i,t-1} + \sum_{i=1}^{P_X} \delta_{I,i} X_{i,t-1} + \sum_{i=1}^{P_T} \gamma_{i,I} \underline{Z}_{t-1} + \varepsilon_{i,t} \quad (18)$$

, where $GDP_{i,t}$ is the growth of Gross Domestic Product and is the dependent variable; $GDP_{i,t-1}$ is the lag of the dependent variable; $OFDI_{i,t-1}$ is the lag of China's Foreign Direct Investment and is the main independent variable; $X_{i,t-1}$ are the lags of the vector of control variables; $\underline{Z}_{i,t-1}$ are lags of the cross-sectional averages; P_{gdp}, P_{ofdi}, P_X, *and* P_T are the lag length of variables; $\lambda_{I,i}$, $\beta_{I,i}$, and $\delta_{I,i}$ are the heterogenous coefficients, γ_i are the heterogenous factor loadings; and $\varepsilon_{i,t}$ is the error term.

Chapter 4. FINDINGS

This chapter displays and analyses the empirical results of the effect of China's OFDI on the economic growth of the V4 countries. The research follows the Augmented Solow growth model using panel data econometrics for the sample period 2004-2020. The model produces results for FGLS, POLS, Fixed Effects, and Random Effects. In addition, the study analyses the economic trends using the Markov-Switching Dynamic Regression model. The Principal Component Analysis Model is applied to create the dimensions of China's foreign direct investment that can better explain the variations in the economic growth of the Visegrád countries. The Cross-Sectional Autoregressive Distributed Lag model is applied to evaluate the short and long-run effect of China's OFDI on V4's economic growth.

4.1 Empirical analysis of the effect of China's outward foreign direct investment on the economic growth of the Visegrád Group

The findings of the panel data study are aligned with the expectations from the hypothesis and provide answers to the research questions. This section mainly explains the results for the empirical effect of China's OFDI and economic growth of the V4 countries based on the dataset ranging from 2004 to 2020. The panel data model explains that the growth of the gross domestic product [*gdp*] is a function of China's outward foreign direct investment in V4 [*fdi*], productive capacities [*pci*], interaction between China's OFDI in V4 and productive capacities [*fxp*], and several control variables. The panel data modelling tools utilized to obtain findings are the FGLS, POLS, Fixed Effects, and the Random Effects model. These findings also pave the way for future studies when data is exogenous factors, and their dynamics becomes available.

Table 3 provides the panel data results for the effect of China's OFDI on the V4's economic growth. The findings depict that China's OFDI has a positive and highly significant impact on the economic growth of the V4 countries. All the utilized panel models reveal that the OFDI-GDP nexus is positive and highly significant at 1 percent level. Based on the Random Effect model (preferred based on the postestimation in chapter 4.5), a percentage increase in China's OFDI increases economic growth of the V4 by an estimated 0.158. The findings are in line with

some previous research while contradicting others. The findings are consistent with previous studies that have found positive and significant effect of FDI on economic growth. For instance, the findings of my research are in line with the observation of Balasubramanyam (1996), Blomstrom et al. (1996), Borensztein (1998), Güner and Yılmaz (2007), Hoang et al. (2010), Li and Liu (2005), Papanek (1973), Wijeweera et al. (2010), which predicted positive and significant effect of FDI and economic growth. Interestingly, the qualitative study by Meunier (2004) found similar result that China's investment is enhancing the economic performance of EU. According Djankov and Hoekman (2000), FDI in Czech Republic during 1992 to 1996 has a positive and significant effect on its economic growth by transferring technology and knowledge. The Chinese investment is transferring capital and technology and V4 has high absorptive capacity to utilize the foreign capital and technology. However, the findings of the study contradict the findings of some other studies such as Bornschier et al. (1978), Durham (2004), Fry (1993), Klobodu and Adam (2016), Naveed and Shabbir (2006), which found FDI impedes on the economic progress.

Solow model states that capital flow can drive the increase of total product output. The FDI inflows to V4 support the economic growth of this region. Borenszterin et al. (1998) mentioned that countries with well-developed human capital would benefit from foreign investment. This study has created interaction of China's OFDI and PCI, in which PCI includes human capital and other factors. The results claim that FDI in the presence of productivity capacities has positive and highly significant effect on V4's economic growth. An increase in the PCI increases GDP growth by an estimated 0.189. Thus, V4's productive capacities have a positive effect on economic growth. An interaction of OFDI and PCI explains that the effect of China's OFDI on the V4's economic growth depends on the productive capacities. This interaction is highly significant at 1 percent level. Hence, the net effect of China's OFDI on V4's economic growth is an estimated 0.2035 [0.158 + 0.0455]. Increasing investment in productive capacities enables the V4 countries to attract and access a pool of foreign capital from multiple countries. This provides the V4 countries with alternative sources of capital instead of relying only on domestic capital which is often not sufficient in financing profitable projects and stimulating economic growth. The United Nations and WTO both have emphasised the importance of strengthening productive capacities to reduce economic growth volatility, build economic resilience to shocks and develop economic growth in a sustainable way. The findings are in line with the research that argued that developing productive capacity would contribute to economic performance (Gnangnon, 2021; Shiferaw 2017).

Besides, other factors included in PCI are also important such as transportation in V4. The North-South transport infrastructure is connecting V4 countries in a planned way. The transportation of V4 is connected into the EU system Trans-European Transport Network (TEN-T). The TEN-T has agreed with V4 in 2020 to develop high-speed railway lines within the V4 countries.

The panel data results also provide the effect of control factors on economic growth. ***Table 3*** also reports that total factor productivity [*tfp*] is significant and positively affect V4's economic growth. This confirms the theoretical framework of this research, Solow growth model, of that technology advancement is an exogenous factor and is the fundamental driver of economic growth. Besides, the control variables fixed capital formation [*fcap*], trade openness [*tro*], savings [*sav*], and population growth [*popgr*] have a positive and significant effect on economic growth.

The results also show that producer price inflation [*ppi*], growth volatility [*vol*], and the 2008 global financial crisis have a negative and significant effect on economic growth. The 2008 financial crisis hit the global economy and partially triggered EU debt crisis, which had a drastic fall of their economic growth. The intercept indicates that the economic growth of the V4 is positive and highly significant, holding other variables constant. China's OFDI, Interaction of OFDI and PCI, and control variables account for 99 percent of the variation in V4's real economic growth. The coefficient of determination provides us with confidence that the selected variables belong in the model. Therefore, this section can be concluded by postulating that China's OFDI has a causal effect on the V4's economic growth during the sample period of 2004 to 2020.

Table 3. The Effect of China's OFDI on Economic Growth of the V4 countries

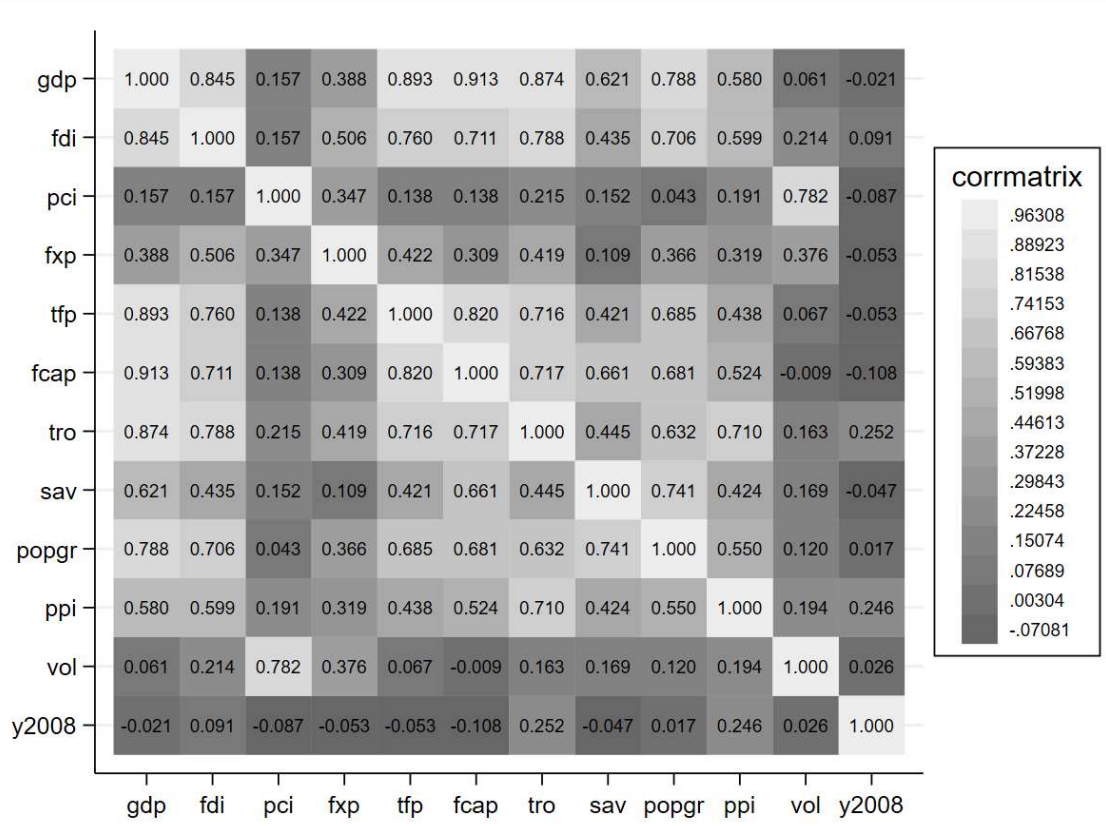
VARIABLES	**(1)**	**(2)**	**(3)**	**(4)**
	FGLS	**POLS**	**FE**	**RE**
fdi	0.145***	0.158***	0.149***	0.158***
	(0.0335)	(0.0183)	(0.00607)	(0.00952)
pci	0.206***	0.189***	0.243**	0.189***
	(0.0700)	(0.0240)	(0.0304)	(0.0491)
fxp	0.0398**	0.0455**	0.0580	0.0455***
	(0.0191)	(0.0165)	(0.0211)	(0.0155)

tfp	0.205***	0.196***	0.214***	0.196***
	(0.0367)	(0.0198)	(0.0154)	(0.0309)
fcap	0.182***	0.183***	0.196*	0.183***
	(0.0377)	(0.0189)	(0.0532)	(0.0559)
tro	0.344***	0.344***	0.345***	0.344***
	(0.0267)	(0.0334)	(0.0283)	(0.0286)
sav	0.0578*	0.0581***	0.0556*	0.0581***
	(0.0291)	(0.0181)	(0.0176)	(0.0189)
popgr	0.116***	0.106***	0.0944**	0.106***
	(0.0291)	(0.0175)	(0.0138)	(0.0110)
ppi	-1.101***	-1.036***	-0.982*	-1.036***
	(0.246)	(0.155)	(0.310)	(0.244)
vol	-0.0669***	-0.0627***	0.166	-0.0627***
	(0.0172)	(0.00742)	(0.110)	(0.0132)
y2008	-3.053***	-3.443***	-3.588	-3.443*
	(0.944)	(0.421)	(1.781)	(2.006)
Constant	13.50***	12.55***	7.796	12.55***
	(4.280)	(1.445)	(3.530)	(2.979)
Observations	68	68	68	68
R-squared	0.992	0.987	0.987	0.9870
Number of id	4	4	4	4

Source: Author's construction. Note: Standard errors in parentheses; Significance level: *** p<0.01, ** p<0.05, * p<0.1

The causal link between China's OFDI and V4's economic growth is supplemented by the expected statistical association. To test association, correlation coefficients are obtained which is provided by ***Figure 12***. It shows that China's OFDI is strongly correlated with the V4's GDP. As described in literature review, most studies find a positive correlation and significant of effect of FDIs on host country's economic growth.

Figure 12. Correlation matrix, 2004-2020



Source: Author's construction. Definition: The correlation coefficient is a value between -1 and +1. A correlation coefficient of +1 indicates a perfect positive correlation. A correlation coefficient of -1 indicates a perfect negative correlation.

There is supplementary confidence in the choice of GDP determinants for this study. Most of the independent variables have strong correlation with GDP. The weak correlation from the exogenous factors, volatility of growth and the 2008 global financial crisis, are expected as they are shocks experienced by the V4 as open economies. The financial crisis has a negative and weak correlation with GDP, productive capacities, FDI and PCI interaction, total factor productivity, fixed capital, and savings. Growth volatility has a strong correlation with production capacities because productive capacities are intimately connected to economic growth volatility. The productive capacities index of the V4 countries are adequately strong and can be comparable to some of the advanced economies. The efficient utilization of productive capacities leads to increased economic growth, whereas underutilization can dampen economic growth.

This research further contributes to the study by provision of a comparative study. The study empirically compares the effect of China, Germany, USA, and World OFDIs to the V4's economic growth from 2004 to 2020. Random Effects are utilized as a preferred model after performing postestimations. The data of China, Germany and USA OFDI in this study remains the FDI as percentage of total FDI to the V4 countries. Due to data availability, the World OFDI measure to the V4 countries is the FDI as percentage of GDP.

In ***Table 3*** *and* ***4***, a positive and highly significant coefficient of China's OFDI suggests that China's OFDI in percentage of total FDI is indeed an important determinant of economic growth in V4. The effect of China's OFDI on V4's GDP growth is 0.158. After accounting for the interaction [*fxp*] of [*fdi*] and [*pci*] the net effect of China's OFDI on V4's GDP is 0.2035 [0.158 + 0.0455]. Comparatively, ***Table 4*** depicts that Germany [*gfi*] OFDIs also have a positive and highly significant effect on the V4's economic growth. The net effect of Germany's OFDI on V4's GDP is 0.1540 [0.155 + (-0.00105)]. Germany has been one of the most important countries to invest in V4 (Becker and Cieslik, 2020). V4's economic growth can be increased by capital, technology and know-how transferred from German companies. However, the interaction of Germany OFDI and productive capacities is not statistically significant. The EU membership is the most important attractiveness factor for Germany to invest in V4. The geographical and cultural proximity of V4 have attracted Germany's investment. According to the Hungarian Investment Promotion Agency (HIPA) and the German-Hungarian Chamber of Industry and Commence (DUIHK) (2022), they state that 171 German investment projects have brought 32000 jobs to Hungary from 2014 to the first half of 2022.

The coefficient of USA [*ufi*] OFDI carries a positive and highly significant sign on V4's economic growth. The net effect of USA's OFDI on V4's GDP growth is 0.1302 [0.0946 + 0.0356]. The recent project of smart investment for V4 and US cooperation advocates that US is undeniable important beside Germany. A positive and significant sign on the interaction term of USA OFDI and PCI supports the notion that FDI is able to generate a detectable beneficial impact on economic growth.
Human capital and efficiency ties are important moderating factors for US to develop the smart investment and positively affect V4's economy.

The World's total FDI [*wfdi*] inflow to the V4 countries also has a significant effect at 10 percent level and increases economic growth. The net effect of the World OFDI on V4's GDP

is 0.1025 [0.0403 + 0.0622]. The interaction of World OFDI [*wfdi*] and productive capacities [*pci*] is significant at 5 percent level. This reflects that the productive capacities are important factors that moderate the FDIs and GDP growth in the V4 countries. Productive capacities increase GDP growth and is highly significant with respect to the estimations of model 1 to 4.

Considering the World FDIs and V4's GDP growth nexus, the study finds that all the control variables are highly significant. Control variables that have a negative effect in all the four models are producer price inflation [*ppi*], GDP growth volatility [*vol*], and the 2008 global financial crisis [*y2008*]. This is consistent with the economic theory between these factors and GDP growth. Model 4, which estimate World OFDI and economic growth nexus, shows that all the independent variables cause variation in GDP growth by an estimated 98 percent. It's confident that the chosen independent variables are adequate determinants of economic growth for this comparative study.

This section can be concluded that the inflow of FDIs in the V4 countries by various countries is significant and causal on economic growth. Hence, China's OFDI is being one of the countries that provides a positive contribution to the V4's economic growth. Besides, the novel contribution of this section is the significance of productive capacities in the China's OFDI and V4's GDP growth.

Table 4. The Effect of China/Germany/USA and World OFDIs on Economic Growth of the V4, 2004-2020

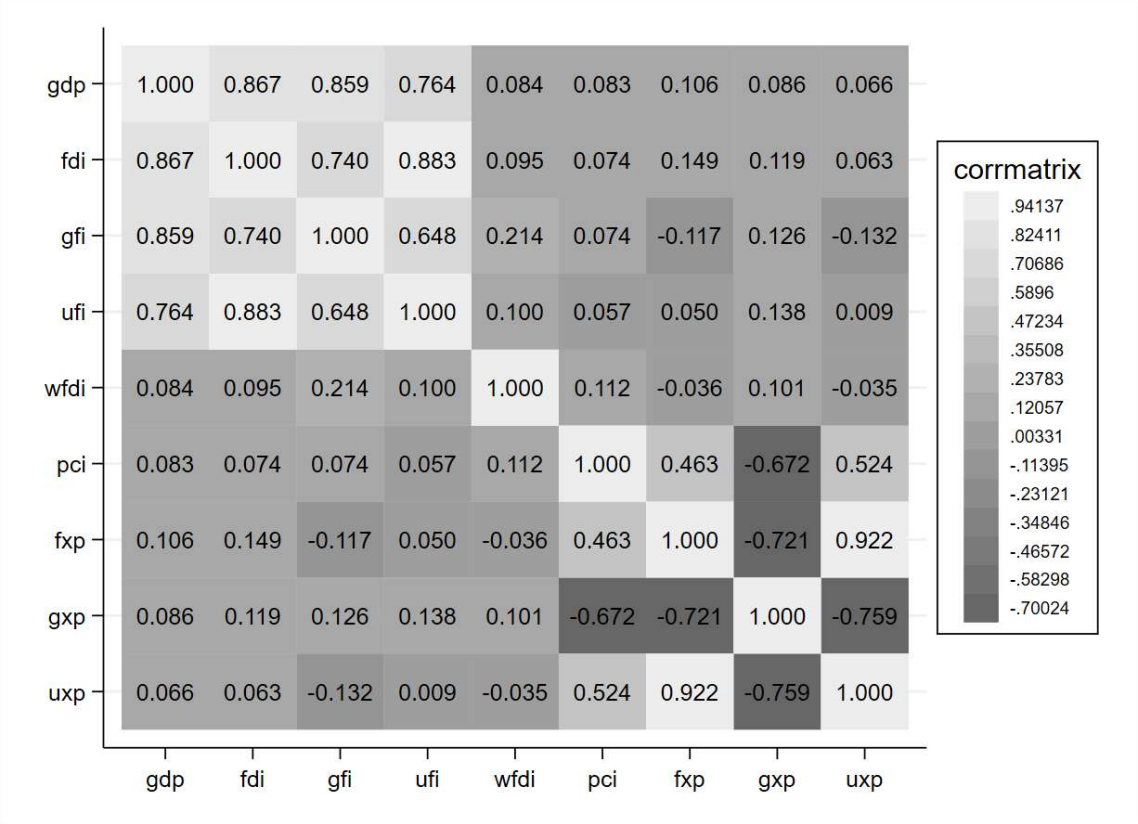
VARIABLES	(1) CHINA	(2) GERMANY	(3) USA	(4) WORLD
fdi	0.158***			
	(0.00952)			
pci	0.189***	0.0169***	0.165***	0.0352***
	(0.0491)	(0.117)	(0.0384)	(0.0476)
fxp	0.0455***			
	(0.0155)			
tfp	0.196***	0.111***	0.186***	0.241***
	(0.0309)	(0.0402)	(0.0155)	(0.0248)
fcap	0.183***	0.240***	0.215***	0.189***
	(0.0559)	(0.0383)	(0.0528)	(0.0266)
tro	0.344***	0.365***	0.359***	0.365***
	(0.0286)	(0.0245)	(0.0208)	(0.0172)

sav	0.0581***	0.0115	0.0430***	0.0606***
	(0.0189)	(0.0235)	(0.0135)	(0.0181)
popgr	0.106***	0.148***	0.137***	0.123***
	(0.0110)	(0.0187)	(0.0160)	(0.0241)
ppi	-1.036***	-1.186***	-0.993***	-0.893***
	(0.244)	(0.245)	(0.285)	(0.158)
vol	-0.0627***	-0.0150	-0.0554***	-0.0378***
	(0.0132)	(0.0281)	(0.0130)	(0.00918)
y2008	-3.443*	-2.904**	-3.474*	-3.461***
	(2.006)	(1.354)	(2.047)	(0.414)
gfi		0.155***		
		(0.0215)		
gxp		-0.00105		
		(0.00815)		
ufi			0.0946***	
			(0.0302)	
uxp			0.0356***	
			(0.00513)	
wfdi				0.0403*
				(0.0192)
wxp				0.0622**
				(0.0241)
Constant	12.55***	0.549***	10.94***	3.226***
	(2.979)	(7.281)	(2.368)	(2.828)
Observations	50	50	50	50
R-squared	0.9870	0.9852	0.9847	0.982
Number of id	4	4	4	4

Source: Author's construction. Note: Standard errors in parentheses; Significance level: *** p<0.01, ** p<0.05, * p<0.1

Figure 13 depicts that the FDIs of Germany and USA are also strongly correlated with the V4 countries GDP growth. The FDIs of China, Germany, and USA are strongly correlated, and each of them weakly correlated with the World OFDI to the V4 countries. The interactions between the FDIs and productive capacities are weakly correlated, meaning that there are latent factors driving these correlations.

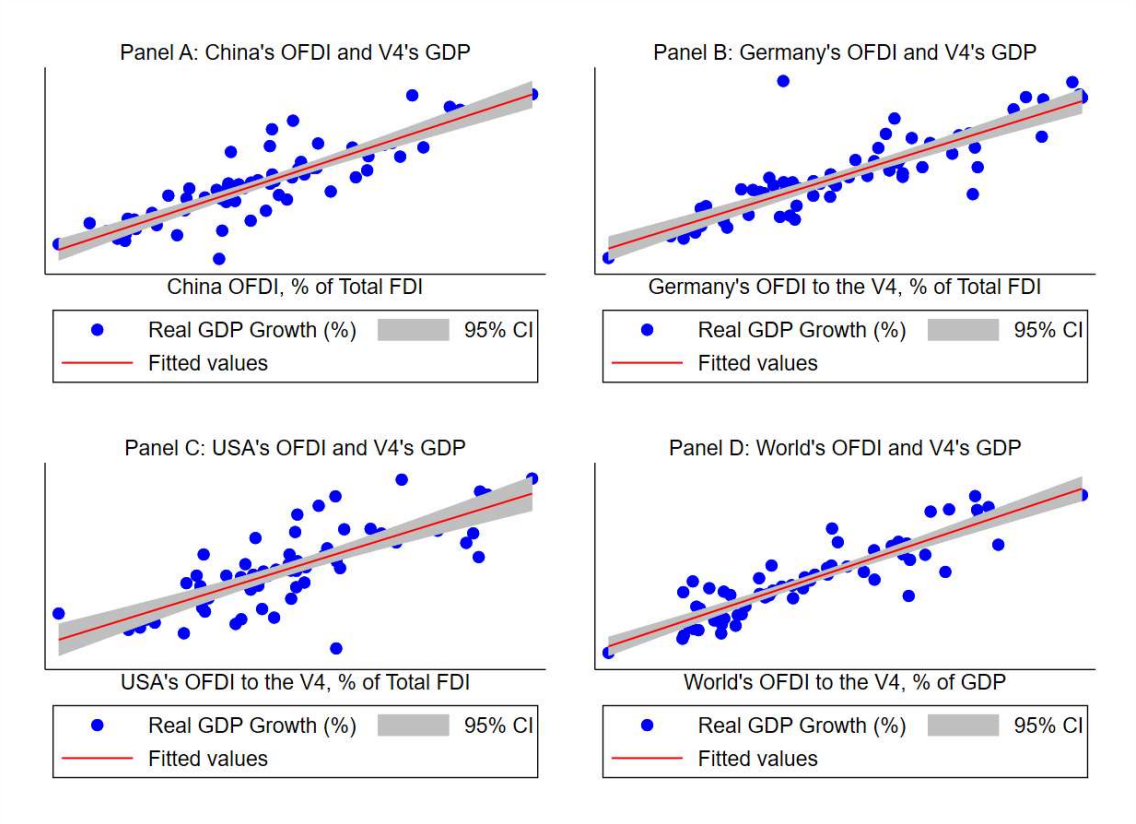
Figure 13. Correlation matrix, 2004-2020



Source: Author's construction. Definition: The correlation coefficient is a value between -1 and +1. A correlation coefficient of +1 indicates a perfect positive correlation. A correlation coefficient of -1 indicates a perfect negative correlation.

Figure 14 graphically depicts a scatterplot of China, Germany, USA, and World's OFDIs and V4's GDP growth. It reveals that an increase in all the OFDIs is associated with an increase in the V4's GDP growth. The relationship between China, Germany, USA, World's OFDI, and V4's GDP is linear. While the World's OFDI and economic growth nexus cannot be generalized, this research finds strong evidence that there is a strong correlation and causal effect in the V4 countries. However, it is still a major debate among economists to conclude that World FDIs increases World GDP. The findings in this research serve as a steppingstone into the importance of China's OFDI to the economic growth of the V4 countries, and the importance of FDIs to World's economic growth.

Figure 14. Scatterplot, 2004-2020



Source: Author's construction.

4.2 Empirical trends analysis of China's outward foreign direct investment on the economic growth of the Visegrád Group

In this study, it is author's interest in capturing the effects of China's OFDI during periods of low and high economic growth states in the V4 countries. This enables us to scientifically understand the China's OFDI and the V4's economic growth dynamics from a sample period 2004 to 2020. This study takes into consideration the role of productive capacities in influencing the relationship between China's OFDI and each country's economic growth in the V4 region. The study also captures the expected duration it takes for economic growth to transition between low and high growth states. The result of the study is analysed with the use of MSDR regression tables. The low economic growth period is referred to as state 1 and high growth period is referred to as state 2. The study refers the probability of remaining in a state 1 as *p11*; the

probability of remaining in state 2 as *p22*; the probability of economic transition from state 1 to state 2 as *p12*; and the probability of economic transition from state 2 to state 1 as *p21*. To analyse the recent economic growth trajectories, this study utilizes the weekly GDP growth data from the OECD (Woloszko, 2020).

Czech Republic

Table 5 summarizes the MSDR regression results for Czech Republic. The results depict that China's OFDI has a positive and significant effect on Czech Republic's real GDP growth in state 1 at 10% level, and a positive and highly significant effect in state 2 at 1% level. Considering productive capacities as a moderating factor between the *fdi* and *gdp*, the results find that China's OFDI has highly significant effect on economic growth of Czech Republic. The *pci* has a positive and highly significant effect on growth in both state 1 and 2. The probability of economic growth remaining in low economic growth state is moderately low and persistent (*p11*=.4507). The probability of economic growth transitioning from low to high growth is low (*p12*=.05493). The probability of economic growth transitioning from high to low growth state is low (*p21*=.08292). The probability of economic growth remaining in high growth periods is high (*p22*=.91705). Given these transition probabilities, the study finds that Czech Republic's economic growth is persistent in its different levels. Remaining in a high growth state takes longer than remaining in a low growth state. This reflects a positively oriented economic growth environment in the long run. However, the expected duration of state 2 is 12 years, which means it takes 12 years for economic growth to transit from high growth periods to low growth periods. This reflects a country with a strong growth trajectory over the sample period. This country has the potential to attract FDIs which positively boost the real GDP growth.

Table 5. Markov-switching dynamic regression – Czech Republic

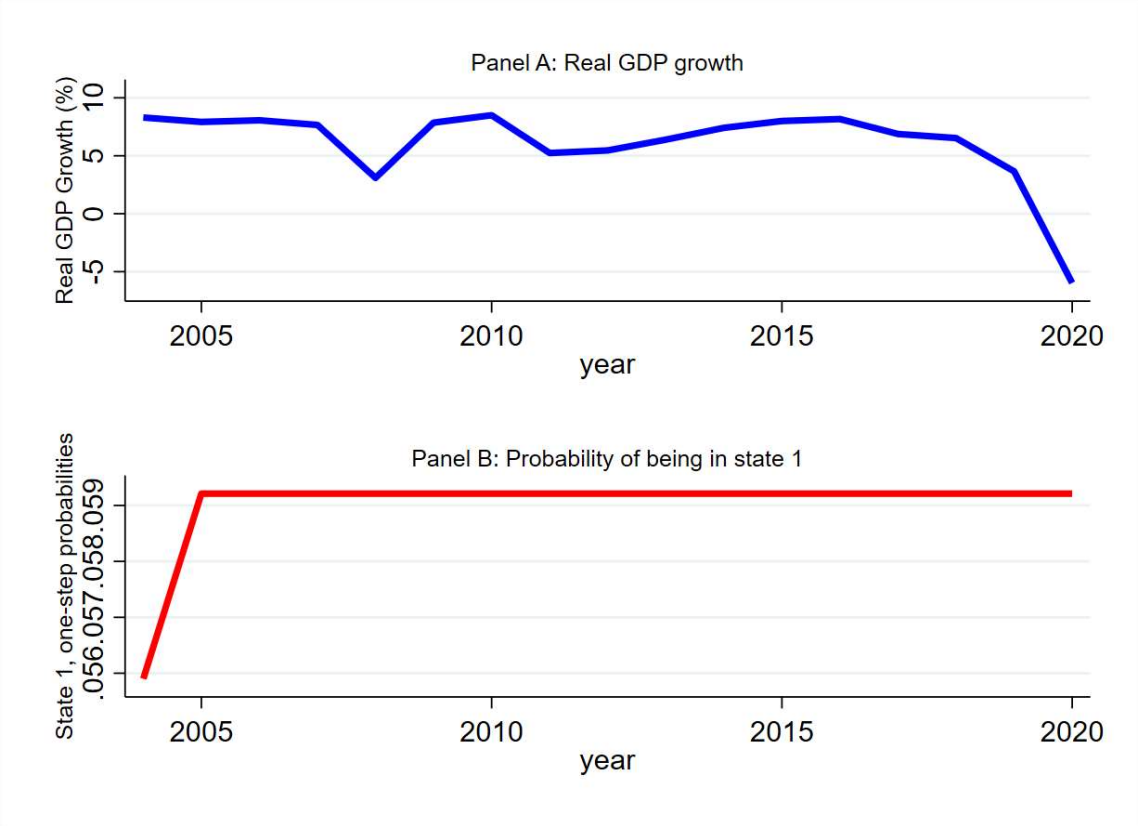
gdp	***Coefficient***	***Standard Error***	***P-value***
State 1			
fdi	.5378177	.2923032	0.066
pci	.787189	.175718	0.000
fxp	.7517353	.0796603	0.000
fcap	.0706244	.0668033	0.290
tro	.9174704	.2175336	0.000

sav	-.311631	.7531992	0.002
popgr	.0680985	.1264687	0.590
ppi	.584884	.149486	0.000
vol	-.012741	.0356432	0.000
y2008	.909526	.184524	0.685
Intercept	-.594375	.695302	0.554
State 2			
fdi	.8329662	.0467368	0.000
pci	.93045	.106766	0.019
fxp	.9352589	.1468322	0.000
fcap	.9436453	.0796389	0.000
tro	.6232592	.0907678	0.000
sav	.102117	.8130501	0.175
popgr	.247683	.5666772	0.028
ppi	.96173	.642107	0.134
vol	.087942	.0336432	0.000
y2008	-.31808	.064057	0.099
Intercept	.886465	.6214668	0.000
Transition			
p11	.4507	.000726	-
p12	.05493	.000726	-
p21	.08292	.0807115	-
p22	.91705	.0807115	-
Expected Duration			
State 1	1.000001	.000726	-
State 2	12.05903	11.73709	-

Source: Author's construction.

Figure 15 depicts the real GDP growth of Czech Republic in Panel A and the probability of being in state 1, a low economic growth period, in Panel B. The results show the probability of being in state 1 has been elevated from year 2005 to 2020. The growth rates have not been different or higher than year 2004, and growth has fallen on average during the sample period. This has set precedence for lower economic growth in the long run. Growth rates dropped due to the 2008 financial crisis and worse of all fell to below zero in 2020. The growth rates of Czech Republic are persistent as the probability of staying in low and high growth can be high. Whereas the probability of exiting any of the states is low. This economy can easily be trapped in low growth when there are no growth potentials.

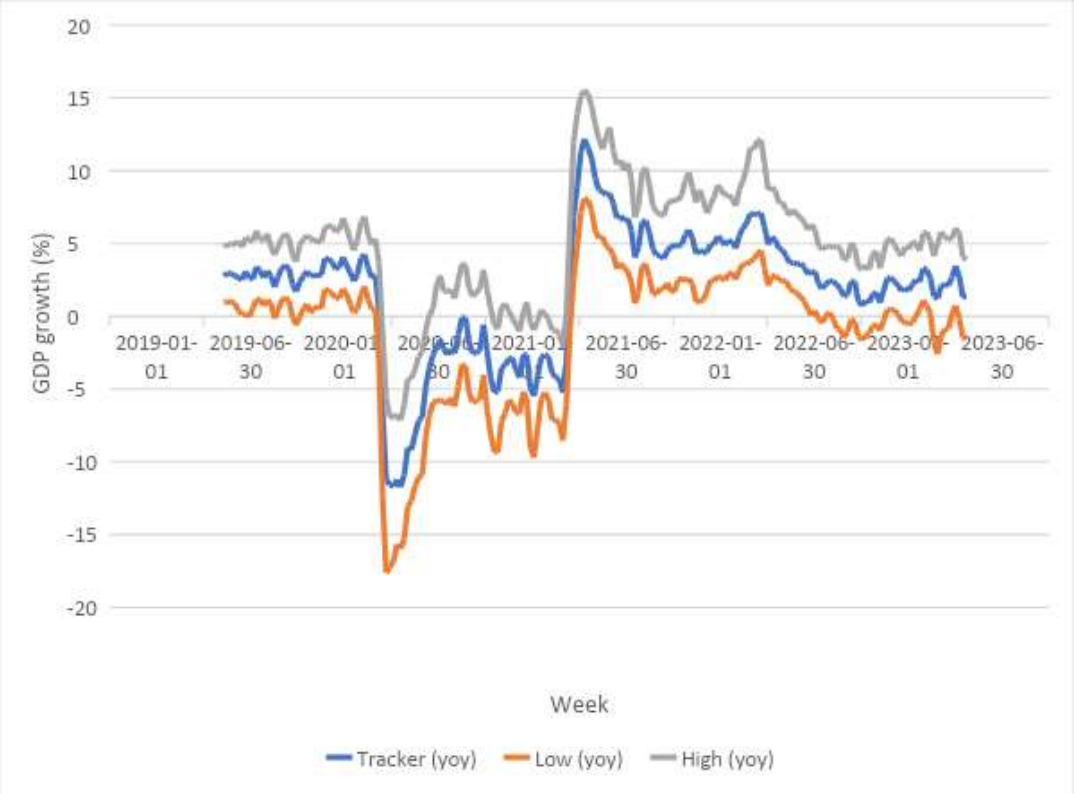
Figure 15. Probability of state 1 and real GDP growth in Czech Republic



Source: Author's construction.

Figure 16 depicts the weekly GDP growth of Czech Republic from 2019 to 2023. The developments of GDP growth have been adversely affected by two exogenous shocks. These shocks are the Covid-19 pandemic and the Ukraine-Russia war. The pandemic lies within the sample period, and the war lies outside the sample period. All these shocks have the potential to impact growth in subsequent periods. GDP growth fell to below zero for one year from March 2020 to March 2021. The country experienced growth from 2021 but hampered by energy price inflation because of the Ukraine-Russia war developments. Consumer and producer price inflation priced-in the effect of energy prices which negatively affected growth in Czech Republic. The war worsened economic growth prospects after the Covid-19 pandemic as GDP growth continue to decrease since March 2022.

Figure 16. Weekly GDP – Czech Republic, 2019-2023



Source: Author's construction. Data from OECD (2020). Note: yoy = year-on-year

Hungary

Table 6 summarizes the MSDR regression results for Hungary. The results depict that China's OFDI has a positive and highly significant effect on Hungary's real GDP growth in state 1 and state 2 at 1% level. Considering productive capacities as a moderating factor between the *fdi* and *gdp*, the results reveal that China's OFDI has a positive and highly significant effect on economic growth in state 1 and significant in state 2 at 5% level. The *pci* has a positive and highly significant effect on growth in both state 1 and 2. The probability of economic growth remaining in low growth periods is high (*p11*=.7132). The probability of economic growth transitioning from low to high growth is low (*p12*=.2868). The probability of economic growth transitioning from high to low growth is high (*p21*=.7072). The probability of economic growth remaining in high growth periods is low (*p22*=.2928). Given these transition probabilities, the

study finds that Hungary's economic growth is fragile when at its high growth and susceptible to being trapped in low economic growth levels. Remaining in a low growth period takes longer than remaining in a high growth period. It takes an estimated 3 years for Hungary to remain a low growth period and 1 year in a high growth period. The country may require a mix of stable macroeconomic policies and industrial policies to become less fragile and boost economic growth in the long run.

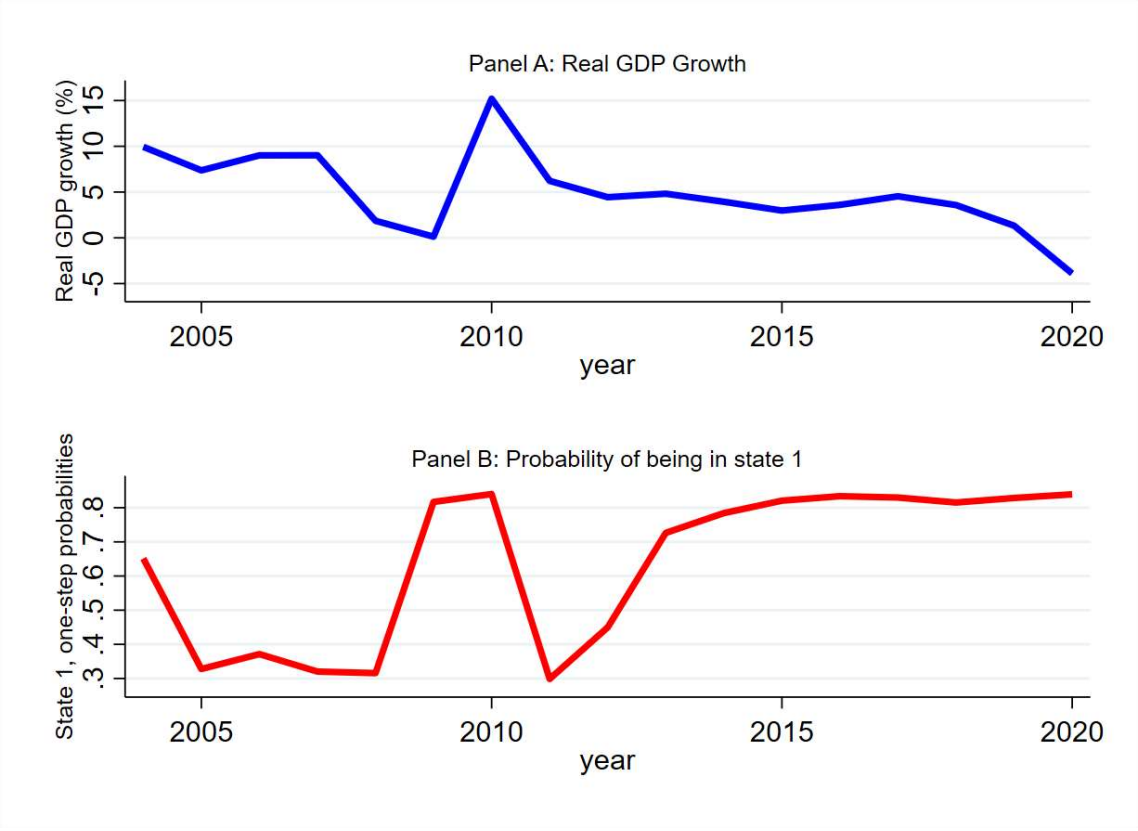
Table 6. Markov-switching dynamic regression – Hungary

gdp	***Coefficient***	***Standard Error***	***P-value***
State 1			
fdi	.8850548	.1697271	0.000
pci	.4766826	.1684303	0.005
fxp	.107343	.3390942	0.001
fcap	.5716491	.1149808	0.000
tro	.5504308	.07693	0.000
sav	.849472	.1397285	0.000
popgr	.849472	.1397285	0.000
ppi	.177459	.11994	0.009
vol	-.224132	.7269473	0.002
y2008	.773133	.353156	0.452
Intercept	.982426	.150731	0.085
State 2			
fdi	.63332	.3305127	0.000
pci	.5411052	.1605567	0.001
fxp	.7973144	.7132994	0.064
fcap	.593367	.0574308	0.000
tro	.7399304	.2840289	0.009
sav	.22653	.2266302	0.318
popgr	.22653	.2266302	0.318
ppi	.8277	5.329882	0.001
vol	-.992355	.4092955	0.000
y2008	-.955	6.784522	0.106
Intercept	.575663	.613331	0.001
Transition			
p11	.7132	.1607082	-
p12	.2868	.1607082	-
p21	.7072034	.248145	-
p22	.2928	.248145	-
Expected Duration			
State 1	3.48574	1.952666	-
State 2	1.41402	.4961545	-

Source: Author's construction. Note: yoy = year-on-year

Figure 17 depicts the real GDP growth of Hungary in Panel A and the probability of being in state 1, a low economic growth period, in Panel B. The study finds the probability of being in state 1 has been low from 2004 to 2007. After the 2008 global financial crisis the probability of state 1 became high and persistent until 2020. This can be reflected by a gradual fall in real GDP growth since 2010. The financial crisis has set precedence for this lower economic growth. Toward the end of the sample period the 2019 pandemic worsened the decrease in economic growth. Hungary can transition between low and high growth states with ease, which makes it a favourable investment destination for FDIs.

Figure 17. Probability of state 1 and real GDP growth in Hungary

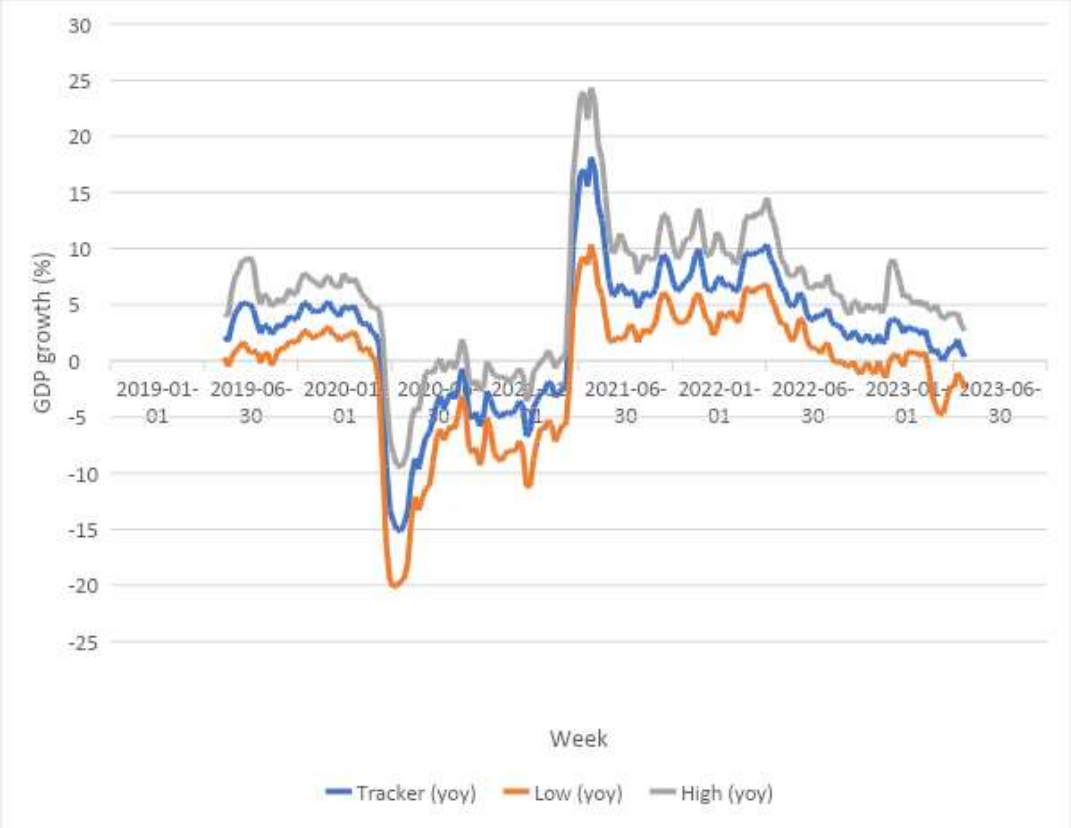


Source: Author's construction.

Figure 18 depicts the weekly GDP growth from 2019 to 2023 with data collected from OECD (2020). This study finds Hungary has also been affected by two exogenous shocks, the Covid-19 pandemic, and the Ukraine-Russia war. GDP growth fell to below zero for one year from

March 2020 to March 2021. The covid-19 pandemic impacted Hungary GDP growth more than in Czech Republic, Poland, and Slovakia. However, the growth trajectories of these countries are positively strongly correlated as shown by their indifferent co-movements. Both the countries came out of recession in March 2021. The country experienced growth from 2021 but hampered by energy price inflation because of the Ukraine-Russia war developments. Consumer and producer price inflation priced-in the effect of energy prices which negatively affected growth. The war worsened economic growth prospects after the Covid-19 pandemic as GDP growth continue to decrease since May 2021. Hungary has the potential to increase its China OFDI since its relationship with China has stronger than other V4 countries. These can set precedence for other large Asian economies to increase their FDIs in Hungary.

Figure 18. Weekly GDP – Hungary, 2019-2023



Source: Author's construction. Data from OECD (2020). Note: yoy = year-on-year

Poland

Table 7 summarizes the MSDR regression results for Poland. The results depict that China's OFDI has a positive and highly significant effect on Poland's real GDP growth in state 1 and state 2 at 1% level. Considering productive capacities as a moderating factor between the *fdi* and *gdp*, China's OFDI has a positive and highly significant effect on economic growth in both state 1 and 2. The *pci* has a positive and highly significant effect on growth in both state 1 and 2. The probability of economic growth remaining in low growth periods is moderately high (*p11*=.5839). The probability of economic growth transitioning from low to high growth is moderately low (*p12*=.416). The probability of economic growth transitioning from high to low growth is low (*p21*=.1491). The probability of economic growth remaining in high growth periods is high (*p22*=.8509). Given these transition probabilities, this research finds that Poland's economic growth is persistent at its high growth levels and can be able to get out of recession quickly. It can at least take 2 years for Poland to stay in a low growth state, and 6 years to stay in a high growth state. This reflects that Poland economic growth trajectory is progressive and have a higher propensity to attract FDIs in the long run.

Table 7. Markov-switching dynamic regression – Poland

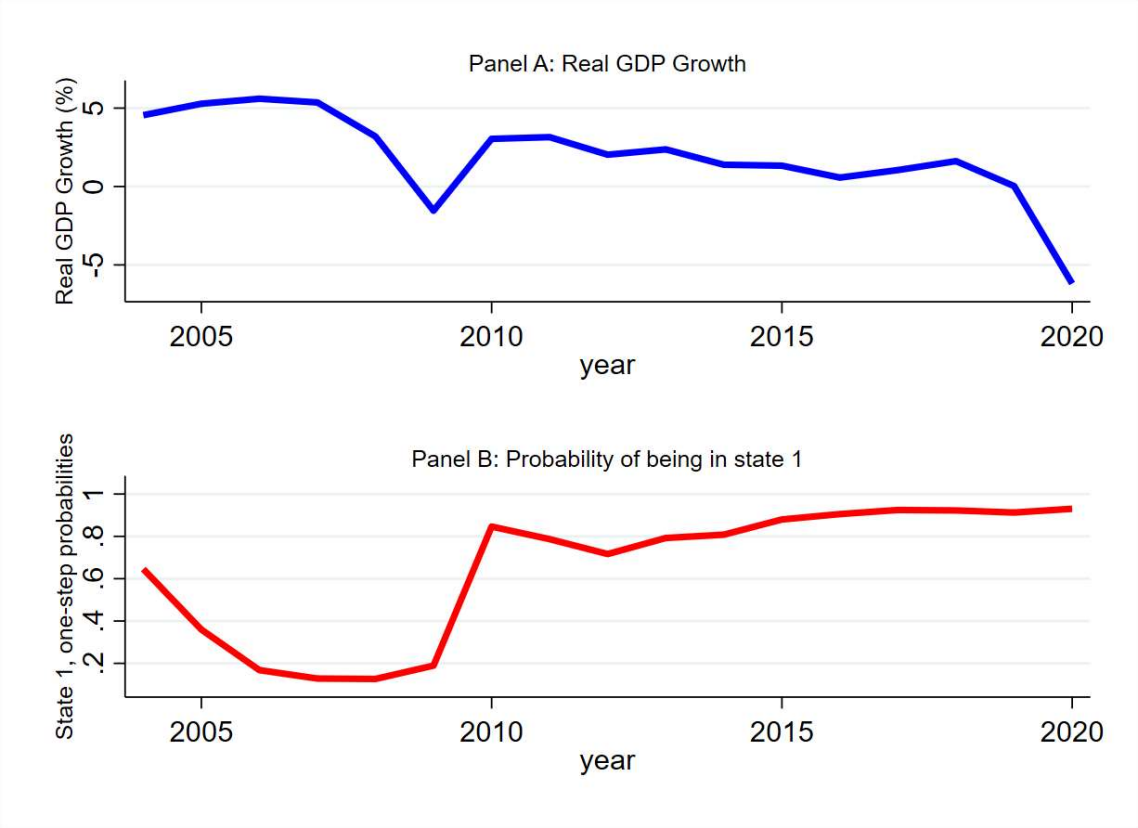
gdp	***Coefficient***	***Standard Error***	***P-value***
State 1			
fdi	.43736	.2543312	0.000
pci	.882564	.7749174	0.000
fxp	.701748	.3355641	0.000
fcap	.7961874	.0240249	0.000
tro	.6033252	.1217369	0.000
sav	.5227111	.0888356	0.000
popgr	.5227111	.0888356	0.000
ppi	.952714	.20134	0.000
vol	-.929421	.90153	0.833
y2008	.517932	.10559	0.854
Intercept	-.18119	.888502	0.000
State 2			
fdi	.9810174	.0696294	0.000
pci	3.164569	.6695838	0.000
fxp	.772508	.3121669	0.000
fcap	.9008356	.0283408	0.000

tro	.8687752	.1113476	0.000
sav	.143986	.1302441	0.000
popgr	.143986	.1302441	0.000
ppi	.588993	.821977	0.000
vol	-.0321297	.613074	0.993
y2008	-.86245	.401084	0.045
Intercept	.93462	.9209518	0.036
Transition			
p11	.5839	.2735339	-
p12	.416	.2735339	-
p21	.1491	.1039694	-
p22	.8509	.1039694	-
Expected Duration			
State 1	2.403424	1.580053	-
State 2	6.705445	4.674776	-

Source: Author's construction.

Figure 19 depicts the real GDP growth of Poland in Panel A and the probability of being in state 1, a low economic growth period, in Panel B. This study finds that the probability of low growth is low before the 2008 financial crisis and associated with increasing economic growth. After the crisis, the probability of low growth increased and is associated with a gradual fall in economic growth since. The Covid-19 pandemic has adversely affected Poland and led to decrease in real GDP growth in 2019 to 2020 of the sample periods. Poland's economic growth is less volatile and have the tendency to persist in the long run.

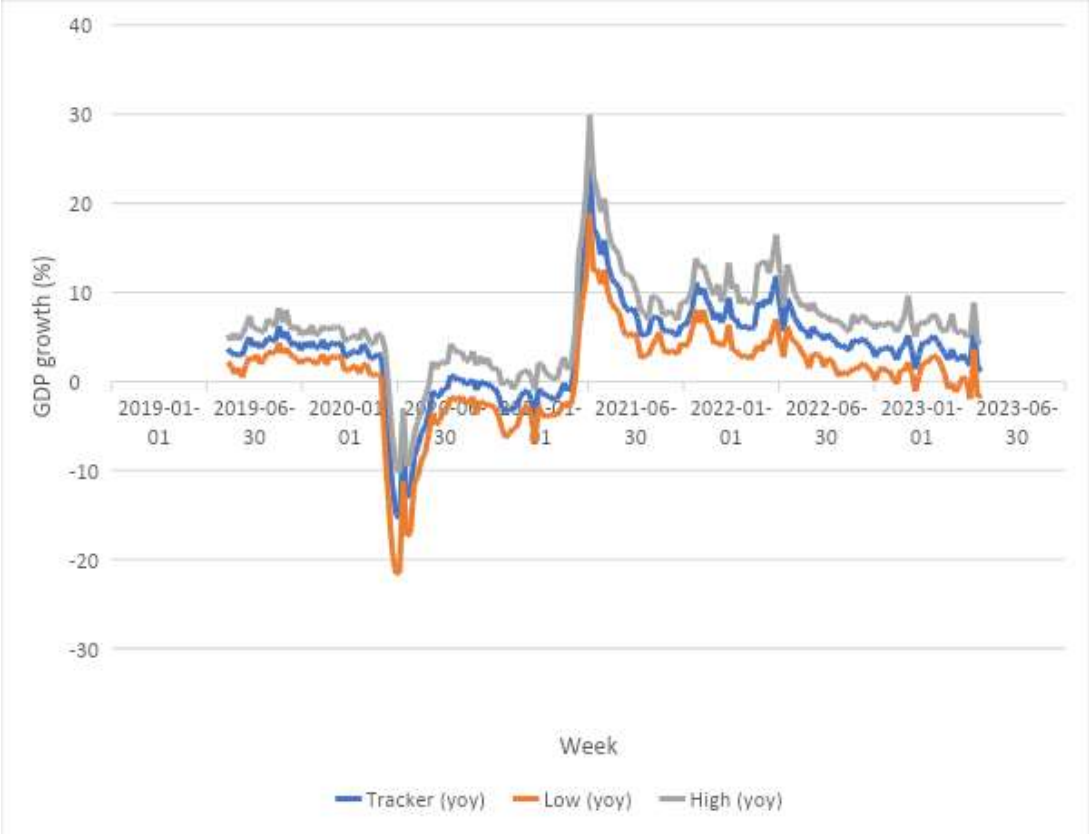
Figure 19. Probability of state 1 and real GDP growth in Poland



Source: Author's construction.

Figure 20 depicts the weekly GDP growth from 2019 to 2023 with data collected from OECD (2020). Poland has also been affected by two exogenous shocks, the Covid-19 pandemic, and the Ukraine-Russia war. GDP growth fell to below zero for one year from March 2020 to March 2021. The results show that the GDP growth of Poland was quite resilient to the Covid-19 pandemic than other V4 countries. The country's growth rates reflect similar co-movements with other V4 countries as it set into recession in March 2020 and set out in March 2021. Poland was also adversely affected by the energy price inflation imported by the Ukraine-Russia war. The war worsened economic growth prospects after the Covid-19 pandemic as GDP growth continue to decrease since April 2021. Poland has a strong economic growth trajectory and can be able to attract FDIs given its potential to remain in high growth states.

Figure 20. Weekly GDP – Poland, 2019-2023



Source: Author's construction. Data from OECD (2020). Note: yoy = year-on-year.

Slovakia

Table 8 summarizes the MSDR regression results for Slovakia. The results depict that China's OFDI has a positive and highly significant effect on Slovakia's real GDP growth in state 1 and state 2 at 1% level. Considering productive capacities as a moderating factor between the *fdi* and *gdp*, this study finds that China's OFDI has a positive and significant effect on economic growth in both state 1 at 5% level and is highly significant in state 2 at 1% level. The *pci* has a positive and highly significant effect on growth in both state 1 and 2.

Table 8. Markov-switching dynamic regression – Slovakia

gdp	***Coefficient***	***Standard Error***	***P-value***

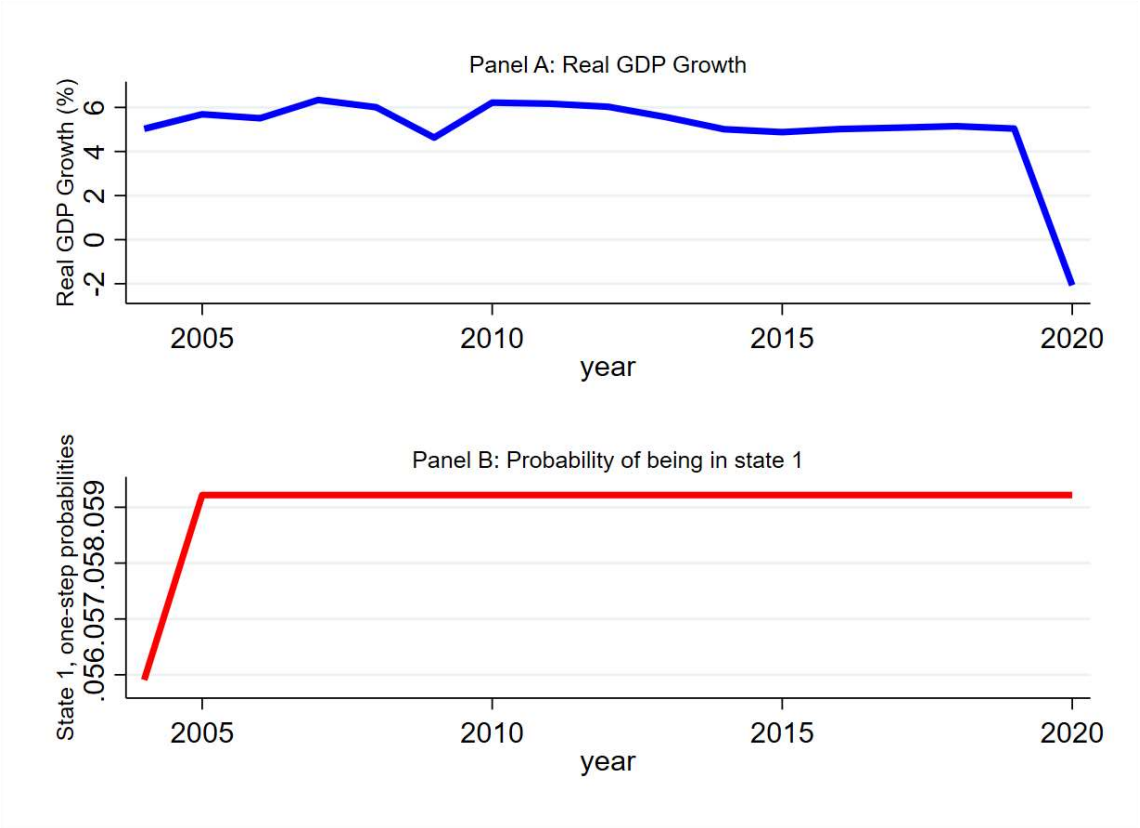
State 1			
fdi	.087987	.1247303	0.000
pci	.397779	.5833917	0.000
fxp	.3045199	.1291702	0.018
fcap	.2773872	.1461497	0.058
tro	.2411091	.148581	0.105
sav	.1066637	.1031066	0.301
popgr	.3796833	.1101163	0.001
ppi	.763572	.816438	0.038
Vol	-.8517647	.528239	0.577
y2008	.61955	.695308	0.113
Intercept	-.871167	.16362	0.000
State 2			
fdi	.7874949	.0504684	0.000
pci	.377723	.7408995	0.000
fxp	.4753946	.1087432	0.000
fcap	.7872558	.0672734	0.000
tro	.8843295	.0497514	0.000
sav	.111575	.1356905	0.000
popgr	-.4621844	.2963496	0.119
ppi	.485779	.250789	0.004
vol	.509134	.035413	0.013
y2008	-.195023	.334842	0.325
Intercept	.742991	.6669905	0.000
Transition			
p11	.3799	.3475707	-
p12	0.62	.3475707	-
p21	.2265	.1225438	-
p22	0.7735	.1225438	-
Expected Duration			
State 1	1.612831	.9041087	-
State 2	4.414937	2.388584	-

Source: Author's construction.

The probability of economic growth remaining in low growth periods is moderately low (*p11*=.3799). The probability of economic growth transitioning from low to high growth is moderately high (*p12*=0.62). The probability of economic growth transitioning from high to low growth is low (*p21*=.2265). The probability of economic growth remaining in high growth periods is high (*p22*=0.7735). Given these transition probabilities this study finds that Slovakia's economic growth is persistent at its high growth levels and can be able to get out of recession quickly than other V4 countries. It can at least take 1 years for Slovakia to stay in a low growth state, and 4 years to stay in a high growth state. Slovakia economic growth trajectory is strong and have the potential to attract FDIs with ease in the long run. Slovakia became a member of the EU in 2004, which opened significant opportunities for trade,

investment, and access to the EU single market. This integration has boosted exports and attracted FDIs into the country. Slovakia has a strong manufacturing base and is a major exporter of automobiles, electronics, and machinery. The country has attracted investments from major international companies, contributing to economic growth and job creation. Due to its relatively low labour costs, strategic location in Central Europe, and business-friendly policies, Slovakia has been able to attract substantial FDI inflows. This has helped to modernize industries and improve productivity.

Figure 21. Probability of state 1 and real GDP growth in Slovakia



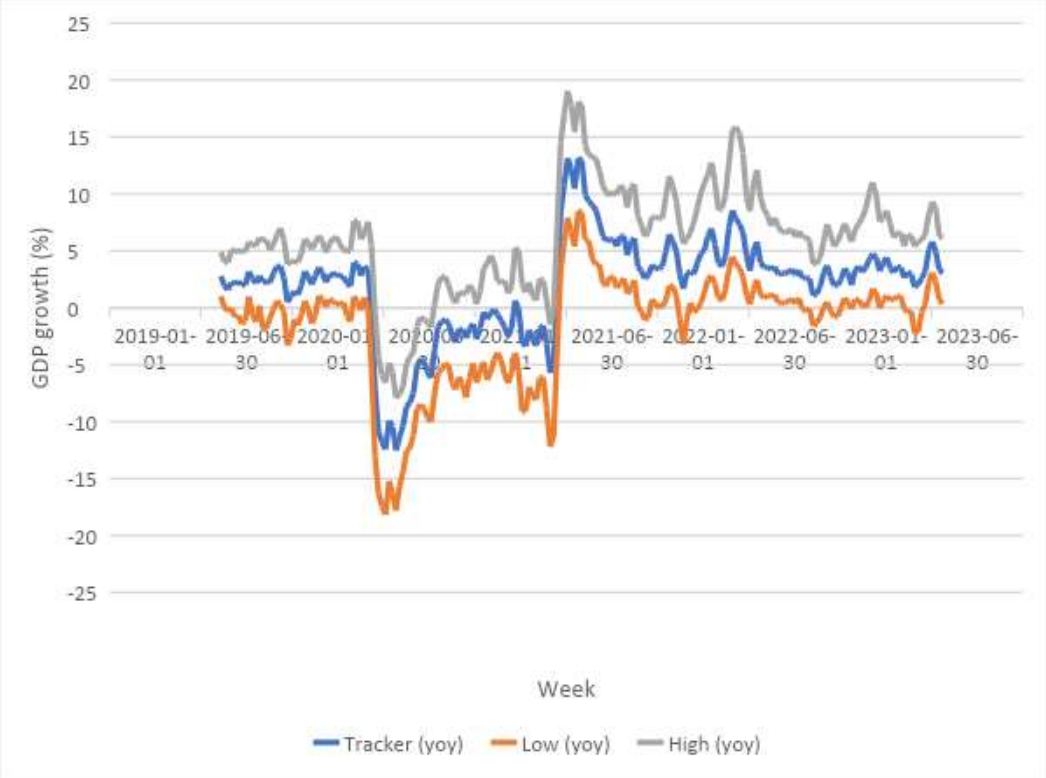
Source: Author's construction.

Figure 21 depicts the real GDP growth of Slovakia in Panel A and the probability of being in state 1, a low economic growth period, in Panel B. Slovakia real GDP growth has been stable and strong during the sample period. The country has the most stable growth in the V4 group during the sample period. The economic growth was resilient to the 2008 global financial crisis but hampered by the Covid-19 pandemic in 2019 to 2020. However, the probability of low

growth has been elevated since 2005 to 2020. This means that latent factors have been a driving force to the growth prospects. This is consistent with the transition probabilities that Slovakia spends less duration in state 1 and more years in high growth periods. Slovakia experienced an attractive growth trajectory in the long-run and set precedence for an increase in FDIs.

Figure 22 depicts the weekly GDP growth from 2019 to 2023 with data collected from OECD (2020). Slovakia has also been affected by two exogenous shocks, the Covid-19 pandemic, and the Ukraine-Russia war. GDP growth fell to below zero for one year from March 2020 to March 2021. The country's growth rates reflect similar co-movements with other V4 countries. Slovakia was also negatively affected by the energy price inflation imported by the Ukraine-Russia war. The war worsened economic growth prospects after the Covid-19 pandemic as GDP growth continue to decrease since May 2021. However, economic growth has been quite volatile from 2021 to 2023.

Figure 22. Weekly GDP – Slovakia, 2019-2023



Source: Author's construction. Data from OECD (2020). Note: yoy = year-on-year

The study postulate that China's OFDI has a positive and significant effect on the V4's economic growth, even after controlling for productive capacities. During periods of economic slowdown or recession, the V4 countries face challenges in achieving robust economic growth due to various factors such as global economic conditions, financial crises, and internal economic issues. Lower global demand for goods and services may negatively affect the export-oriented economies of the V4 countries. In low growth periods, foreign investors might be more cautious, leading to a decline in FDIs inflows. Economic slowdowns can put pressure on government finances, limiting their ability to invest in infrastructure and development projects. Economic downturns can lead to higher unemployment rates and exacerbate income inequality, impacting overall economic stability. The V4 countries experienced economic challenges during the 2008 global financial crisis and the Eurozone crisis. Their ability to navigate and recover from these crises provides valuable lessons in crisis management and policy resilience. During times of economic expansion and favourable conditions, the V4 countries can experience strong economic growth. Strong global demand for V4 countries' exports can boost economic growth, especially if they specialize in high-demand industries. In times of economic optimism, foreign investors might see opportunities in the V4 countries, leading to increased FDI inflows. Investment in infrastructure projects can stimulate economic activity and productivity. Implementation of pro-business and market-friendly reforms can enhance competitiveness and attract investments. Access to European Union funds can support various development projects and regional initiatives, fostering economic growth. Embracing technological advancements and fostering innovation can boost productivity and economic performance.

4.3 Composite Effect of China's outward foreign direct investment on the economic growth of the Visegrád Group

The initial step to the application of principal component analysis (PCA) is to investigate if it is applicable based on the dataset. The PCA study evaluates the data using the *Kaiser-Meyer-Olkin* (KMO) measure of sampling adequacy. It is usually used in postestimation. The KMO test is a statistical measure that reveals if the data in the study is suitable for applying PCA (Bro and Smilde, 2014). It is commonly known as the Measure of Sampling Adequacy (MSA). To apply PCA, an overall KMO value of at least 50 percent and greater is needed. A score equal

to and higher than 50 percent means that the independent variables in the model have something in common to warrant the application of PCA (Dunteman, 1989).

Table 9. Data Evaluation

Variable	KMO	SMC
fdi	0.8705	0.7758
pci	0.5347	0.7055
fxp	0.8670	0.4144
tfp	0.7567	0.8185
fcap	0.7087	0.8684
tro	0.8623	0.7896
sav	0.5799	0.7806
popgr	0.7411	0.8111
ppi	0.8643	0.5737
vol	0.4855	0.7332
y2008	0.3798	0.2981
Overall	**0.7342**	

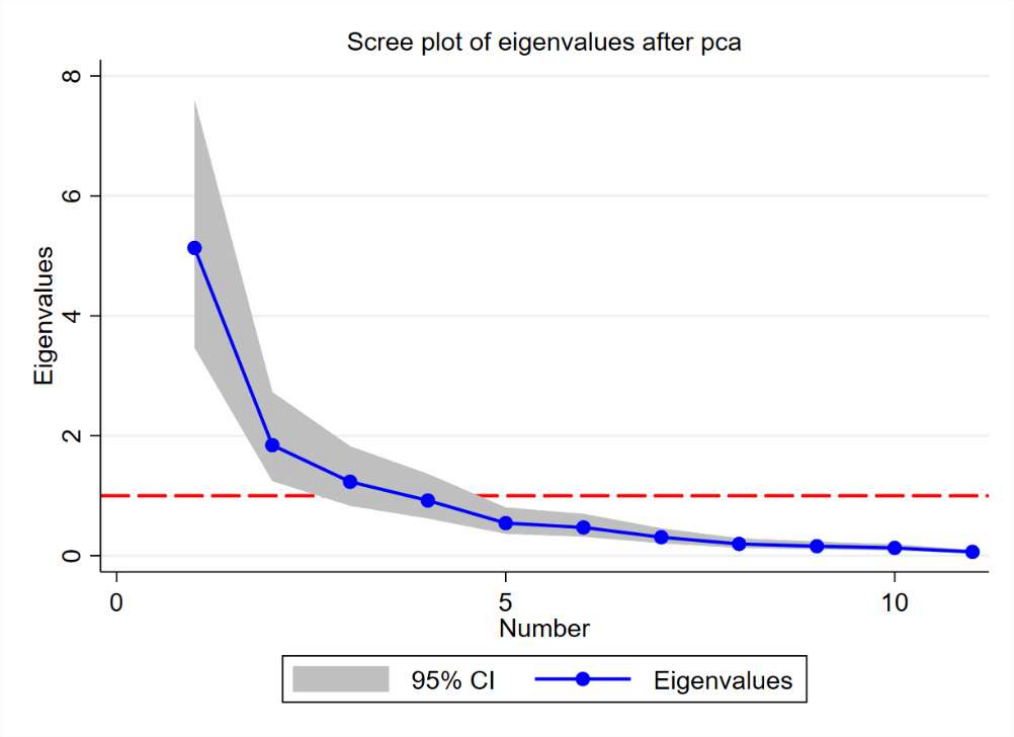
Source: Author's construction.

Table 9 depicts the KMO and SMC tests of data evaluation. The results find that the KMO score from the data is 73.42 percent, which strongly necessitates the use of PCA. This score is of high quality and justifies greater adequacy. It is also necessary to know if each variable can be explained by any other variable in the model. For this purpose, the research applies the *Squared Multiple Correlation* (SMC) test which is the coefficient of determination for each variable regressed on other variables in the model. It is usually used in pre-estimation. the SMC values ranges from high to moderate scores, which means that all the variables have a strong and adequate linear relationship with each other.

The purpose of PCA is reducing the number of variables to a small set of independent variables that can better explain their variations on the dependent variable (Abdi and Williams, 2010). These are composite of variables that can be used in the estimation of China's OFDI and economic growth of the V4 countries. All the information about the variation is retained by the

reduced form of the variables in the model. In this study, PCA yields 3 components that should be retained for further utilization in the regression modelling. The consideration of the 3 components is derived from the scree-plot. ***Figure 23*** depicts scree-plot of eigenvalues. Based on the scree-plot, only components that have eigenvalues of at least 1 and higher are retained (Dray, 2008). This means that most of the effects of China's OFDI on V4's economic growth is determined from these 3 components. Component 1 has a higher variation than the subsequent components.

Figure 23. Scree plot of Eigenvalues



Source: Author's construction.

In the PCA analysis, the author keeps the components loadings, that is, coefficients that have a value higher than at least 30 percent (Ferré, 1995). These are the coefficients that can be preferred as significant based on the PCA theory (Horel, 1984). The proportions that are explained and unexplained by the components are provided in ***Table 10.*** The table depicts that component 1 explains most of the variations by at least 6 variables; component 2 explains most of the variations by at least 2 variables; component 3 explains most of the variations by 2

variables. The blank space in the table means that the component values are below 30 percent and will not be retained.

Table 10. Principal Components

Variable	Component 1	Component 2	Component 3	Unexplained
fdi	0.3891			.2149
pci		0.6335		.162
fxp				.5391
tfp	0.3695			.2451
fcap	0.3776			.1494
tro	0.3855			.1623
sav				.4752
popgr	0.3711			.238
ppi	0.3217		0.3268	.3369
vol		0.6492		.1404
y2008			0.8374	.1262

Source: Author's construction.

The first component measures the extent to which *FDI, PCI, TFP, FCAP, TRO, POPGR*, and *PPI* increase. Component 2 measures the extent to which *PCI* and *VOL* increase. Component 3 measures how the *PPI* and *y2008* increase. The title of each component is attributed to the variable with a highest coefficient. Hence, component 1 can be labelled as "the dimension of China's OFDI"; component 2 can be labelled as "the dimension of Volatility of real GDP"; and component 3 can be labelled as "the dimension of the 2008 Global Financial Crisis". China's OFDI has a high association with both components 1, meaning that components 1 is a latent variable that can be used to explain the variation in China's OFDI.

The study continues to regress the components which are therefore used to estimate economic growth of the V4 countries. Quantile regression is used to find the effects of the components at low (.25), moderate (.50), and high (.75) levels of V4's economic growth. Quantile regression enables greater comprehensive estimations. ***Table 11*** denotes the results of quantile regressions

with economic growth as the dependent variable and components as independent variables. An increase in the *dimension of FDI* (*pc1*) has a positive and highly significant effect when economic growth (*gdp*) is at its .50 and .75 percentile, and moderately significant at its .25 percentile. The *dimension of Volatility* (*pc2*) has a negative and significant effect when economic growth is at its .50 and .75 percentile. *Pc2* is not significant when economic growth is at the .25 percentile. The dimension of the *2008 Global Financial Crisis* is not statistically significant at all levels of economic growth. The study can conclude that China's OFDI has positive effect in all levels of economic growth of the V4 countries.

Table 11. The Composite Effects on V4's Economic Growth at Different Quantiles

gdp	*(1)* ***0.25***	*(2)* ***0.50***	*(3)* ***0.75***
pc1	0.330** (3.45)	0.343*** (7.33)	0.274*** (8.49)
pc2	-0.212 (-1.70)	-0.199** (-3.28)	-0.145** (-3.45)
pc3	0.0152 (0.09)	-0.0213 (-0.26)	-0.0807 (-1.44)
Intercept	1.699*** (8.41)	1.957*** (19.85)	2.227*** (32.73)
N	68	68	68

Source: Author's construction. Note: Statistical significance: *p<0.05, **p<0.01, ***p<0.001.
Value in parenthesis are standard errors.

The positive and significant effect of the component of China's OFDI to the V4 countries can be attributed to the dynamics of China's investments. Chinese OFDI often targets infrastructure projects in the V4 countries, such as roads, railways, energy facilities, and telecommunication networks. Improved infrastructure can enhance the countries' productivity, transportation efficiency, and overall economic development, contributing to GDP growth. OFDI from China leads to the establishment of new businesses and expansion of existing ones in the V4 countries. This results in job creation, reducing unemployment rates and increasing consumer spending power, which in turn stimulates economic growth. Chinese investors bring advanced

technologies, managerial expertise, and knowledge to the V4 countries. This can help local companies improve their production processes, adopt more efficient methods, and enhance their competitiveness in both domestic and international markets, positively impacting GDP growth. Chinese OFDI create export opportunities for the V4 countries, especially when the investments are made in sectors that are intricately linked to global supply chains. Increased exports boost GDP growth by generating additional revenue for the domestic economy. For the V4 countries, attracting FDI from China is advantageous as it diversifies their sources of investment. Relying on multiple foreign investors reduces dependency on any single country and can make the economy more resilient to external shocks. Chinese companies investing in the V4 countries may use them as a base to access the European Union's market more easily. This can lead to increased exports and production, further driving economic growth.

4.4 The short and long-run effect of China's outward foreign direct investment on the economic growth of the Visegrád Group

This research is utilizing the Cross-Sectional (CS-ARDL) model to analyse panel data from the period 2004 to 2020. The model enables the study to estimate the short-run effects of the China's OFDI, which helps to understand the immediate impact of changes in the V4's economic growth. It has not been a long time for China to target in V4 as a crucial foreign investment destination. China's FDI in V4 in percentage of total FDI drastically increased from 2013. Therefore, the short-run effects of China's OFDI in V4's economic growth is very important to study. In addition to short-run dynamics, the model also enables to estimate the long-run relationship. Identifying long-run equilibrium relationships is essential for understanding the sustained impact of China's OFDI on economic growth of the V4 countries. The model's approach is robust to endogeneity and omitted variable bias, which are common issues in econometric analysis (Ameer et al., 2020). By utilizing lagged dependent variables and contemporaneous cross-sectional information, the model provides consistent estimates even in the presence of these problems. Therefore, by employing this model, this study has efficiently used all the information available in the data and obtained more precise parameter estimates.

The CS-ARDL model enables us to capture heterogeneity and provide insights into how the relationship between variables varies across the V4 countries. The study separates short-run

and long-run effects because it can be valuable for the contribution to the FDI-growth nexus studies and policymakers. It can help policymakers identify whether certain developments, policies, and shocks have immediate effects or if their impact unfolds over time, allowing for more informed decision-making. In economics, the short run can mean a period between one to five years, and the long run can mean a period of more than five years. Short-run estimates are important for sustained and positive economic activities, and long-run estimates are important in economic planning (Georgescu-Roegen, 1975).

The dependent variable is real GDP growth [*gdp*]. The main independent variables of interest are China's Outward Foreign Direct Investment [*fdi*], productive capacities [pci], and the interaction of *fdi* and *pci*. In addition, controls variables are also added as determinants of economic growth. The CS-ARDL regression for this study produces results depicted in ***Table 12***. The table summarizes the short and long-run effects of China's OFDI on V4's economic growth. From the table, the study finds that China's OFDI has a positive and highly significant effect on V4's economic growth in both the short and long-run. Its contribution is large in the long-run [.5162] than in the short-run [.4575].

Table 12. Short and Long-Run Effect of China OFDI on V4's Economic Growth

gdp	***Coef.***	***Std. Err.***	***z***	***P>z***
Short Run Estimates *Mean Group:*				
L.gdp	-.0050809	.1610187	-0.03	0.000
fdi	.4575021	.1119063	4.09	0.000
pci	.0029294	.9804852	0.00	0.031
fxp	.092173	.3217171	0.29	0.017
tfp	.3694182	.1066789	3.46	0.001
fcap	.3662439	.1492978	2.45	0.014
tro	.4336527	.2211482	1.96	0.050
sav	.0603502	.0808277	0.75	0.000
popgr	.1573715	.1358791	1.16	0.087
ppi	-.1780301	6.105687	-0.03	0.000

vol	-.2503338	.5043011	-0.50	0.000
y2008	-.7437602	3.891865	-0.20	0.000
Long Run Estimates *Mean Group:*				
fdi	.5162018	.1645366	3.14	0.000
pci	.187377	.9298393	0.20	0.002
fxp	.1423734	.5902697	0.24	0.000
tfp	.5758641	.2720795	2.12	0.034
fcap	.3163755	.1082236	2.92	0.003
tro	.502648	.3299853	1.52	0.000
sav	.0588781	.0777783	0.76	0.058
popgr	.1694927	.1194104	1.42	0.000
ppi	-.241312	.1515078	-8.19	0.072
vol	-.3568948	.514809	-0.69	0.035
y2008	-.0116279	3.891865	-0.00	0.000
Number of Observations				*68*
Number of Groups				*4*
R-squared (Mean Group)				*0.92*

Source: Author's construction. Statistical significance: *p<0.05, **p<0.01, ***p<0.001.

This study contributes that the productive capacities have a positive and significant effect on economic growth and moderate the China's OFDI and real GDP nexus. Therefore, the net effect of China's OFDI on V4's economic growth is 0.5497 [.4575 + .9022] in the short-run, and 0.6586 [.5162 + .1424] in the long-run. Other independent variables that have a positive and significant effect in both the short and long-run are total factor productivity, fixed capital formation, trade openness, savings, and population growth.

Independent variables that have a negative and significant effect in both the short and long-run are producer price inflation, volatility, and the 2008 global financial crisis. The lag of real GDP as required to be captured by the model, has an estimated negative effect on real GDP growth. The exogenous shock *y2008* has a negative larger effect in the short-run than in the long-run. The V4 countries should ensure that they have macroeconomic stability policies that are stronger to avoid the large losses of GDP, especially in the short run. Stability of their

macroeconomic environment can reduce real GDP volatility which also exerts a negative effect on their economic growth. Real GDP growth is a measure adjusted for inflation. Therefore, keeping inflation as low as possible can stabilize the volatility of GDP and reduce losses in economic growth.

This research accepts the hypothesis that China's OFDI have a positive and significant effect in the both the short and long-run, even after controlling for the effect of productive capacities. The positive effect of productive capacities [*pci*] on economic growth is low [.0029] in the short-run, while in the long-run is high [.1873]. Though significant and lower, this means that productive capacities may take longer to sufficiently increase economic growth in the V4 countries. The *pci* effect is representative of the aggregated effect of human capital, natural capital, energy, transport, information and communication technology, institutions, private sector (ease of cross-border trade), and structural change.

The findings are consistent with other scholars in the FDI-growth nexus in the short and long-run. For example, a study by Nhung (2017) used ARDL model and found that FDI has a positive and significant effect on Vietnam's economic growth in the long run. However, their study found no significant effect in the short run. A study by Gligorić et al. (2017) used ARDL model and finds that the FDI has positive and significant effect on economic growth of commonwealth and independent states in both the short and long-run. Their finding is related to the results of this research, as they also find that the effect size of FDI is higher in the long-run than in the short-run. Popescu (2014) studied the nexus using a qualitative method to study the effect of FDI on economic growth nexus in the CEE countries. This study is consistent with the concluding remarks in this research about those productive capacities plays a key role in attracting FDIs in the V4 countries. Studying the effects of China's OFDI in the V4 countries is important as a growing number of scholars are finding that inward FDI is the largest contributor to economic growth in the V4 countries (Simionescu, 2018; Nezinský and Fifeková, 2014). The common missing feature in the empirical studies of FDI and economic growth of the V4 countries is the lack of taking the productive capacities index into consideration. Hence, this study fills the gap by estimating the PCI-adjusted China's OFDI effect on the V4's economic growth in the short and long-run horizon.

4.5 Post estimation

I. Cronbach alpha

This dissertation is using the Cronbach alpha as a statistical measure to assess the internal consistency or reliability of a set of variables (Cronbach, 1951). It is commonly used to evaluate the extent to which the variables in a test are measuring the same concept. The concept that is measured is the V4's GDP growth. The value of Cronbach's alpha ranges from 0 to 1. Generally, a value of 0.70 or higher is considered acceptable for most research purposes. The closer the value is to 1, the higher the internal consistency of the variables, indicating that they are strongly related to each other and measuring the same concept. On the other hand, if the value is closer to 0, it suggests that the items in the scale are not consistently measuring the same thing, indicating low internal consistency.

Table 13. Cronbach alpha - Internal reliability of variables

Item	**Obs**	**Sign**	**item-rest correlation**	**alpha**
fdi	68	+	0.7829	0.7572
pci	68	+	0.1480	0.8218
fxp	68	+	0.1780	0.8173
tfp	68	+	0.7013	0.7664
fcap	68	+	0.6530	0.7708
tro	68	+	0.8119	0.7531
sav	68	+	0.5491	0.7800
popgr	68	+	0.5983	0.7764
ppi	68	+	0.6612	0.7715
vol	68	+	0.1314	0.8246
y2008	68	+	0.0143	0.8337
Test scale				**0.8063**

Source: Author's construction.

The *Cronbach's alpha* test scale of 0.8063 in ***Table 13*** explains that the independent variables that have chosen as determinants of economic growth are reliable and measuring the same concept. Item-rest correlation tells us the correlation of each variable with the rest of the variables. The variables that have low correlation with the set of variables are *PCI, FXP, VOL,* and *y2008*. Removing a variable such as *y2008* will increase reliability by an estimated 0.8337, which is the highest variables alpha. However, removing these variables that have low correlation with the whole set of variables does make a large difference and hence it is justifiable to keep them in the model. The Cronbach alpha for this study is large enough to continue with further estimations without removing or adding variables.

II. Hausman Test: Fixed or Random Effect Model

To decide the preferred model, this research is utilizing the Hausman test. The test enables making a choice between the Random and Fixed Effects (Hausman, 1978). The null hypothesis of the test is that the Random Effect model is preferred, and the alternative hypothesis is that the Fixed Effects model is preferred. The Hausman test in ***Figure 24*** presents that the Random Effect is preferred, as the *Prob>chi2* = 0.2705 is greater than the significance level of 0.05. The Hausman test also tells that the model does not suffer from *endogeneity*, where the independent variables can be suspected to be correlated with the error terms. The Random Effects model is a common approach used in panel data analysis and offer us advantages in handling the specific characteristics of panel data. Panel data often contain unobserved individual-specific characteristics that can affect the outcome variable but are not directly measured. Random effects models account for such unobserved heterogeneity by allowing the intercept term to vary randomly across different individuals while estimating the effects of other variables. This helps control for individual-specific differences that might confound the relationships between the dependent and independent variables. Therefore, the main findings of this research are based on the *RE* model coefficients, even when there are no large differences in estimations from other models.

Figure 24. Hauman test

```
Test:  Ho:  difference in coefficients not systematic

             chi2(2) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                     =        2.61
           Prob>chi2 =      0.2705
           (V_b-V_B is not positive definite)
```

III. Pesaran Cross-Sectional Dependence Test (CD Test)

The Pesaran CD test is a diagnostic test used to detect cross-sectional dependence in panel data. Cross-sectional dependence occurs when the observations across different units are not independent, and the behaviour of one unit is influenced by the behaviour of other units in the dataset (De Hoyos and Sarafidis, 2006). The null hypothesis of the Pesaran CD test is that there is no cross-sectional dependence among the units in the panel dataset. This correlation among units can violate the assumption of independence, which is crucial for many standard panel data models and may lead to biased or inefficient estimates. After performing the CD test using Random Effects model, the research finds that the Pesaran's test of cross-sectional independence [= *-2.069, Pr = 0.0385*] provides no sufficient evidence to conclude the presence of cross-sectional dependence.

IV. Breusch-Pagan Lagrange multiplier (LM Test): Testing for random effects and Heteroskedasticity

The LM test help us decide the preferred model between the Random Effects and Pooled OLS (Breusch and Pagan, 1980). The null hypothesis is that the variances across the countries are zero. This means that there is no significant difference across countries, that is, there is no panel effect. ***Figure 25*** presents that there is there is no significant difference between RE and POLS models. However, this study continues to prefer the Random Effects model because POLS model can bias the empirical conclusions in panel data studies. The LM test is also used to test for heteroskedasticity which means the variability of the errors in a regression model is not

constant across all levels of the independent variables (White, 1980). When heteroskedasticity is present, the ordinary least squares estimator, which assumes homoskedasticity, may produce biased coefficient estimates. This can lead to incorrect inferences and conclusions about the relationships between the dependent and independent variables. The LM test also tells us that the data does not suffer from heteroskedasticity.

Figure 25. LM for testing Random Effect model

```
gdp[id,t] = Xb + u[id] + e[id,t]

Estimated results:
                    |        Var     sd = sqrt(Var)
--------------------+------------------------------
                gdp |   117.6519       10.84675
                  e |   1.934872       1.390997
                  u |          0              0

Test:   Var(u) = 0
                          chibar2(01) =      0.00
                       Prob > chibar2 =    1.0000
```

V. Lagrange multiplier Serial Correlation Test

This research may not suspect serial correlation in the data as the number of years in the study are slightly less than 20 years. But to avoid its possibility and estimation bias, this dissertation is going to test it. Serial correlation, also known as autocorrelation, occurs when the errors in one time are correlated with the errors in previous or subsequent time periods, violating the assumption of independence of the error terms (Nankervis and Savin, 2010). The presence of serial correlation can bias the standard errors and the estimated coefficients. ***Figure 26*** presents the Wooldridge test for autocorrelation. Since the *p-value* [0.4508] is greater than significance level [0.05], this implies that there is no sufficient evidence to conclude the presence of autocorrelation in the random effect model.

Figure 26. Serial correlation test

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,       2) =      0.820
           Prob > F =      0.4608
```

VI. Multicollinearity Test

Testing for multicollinearity is important because it can help assess the presence and severity of perfect correlation among independent variables in the regression model. Multicollinearity occurs when two or more independent variables in a regression model are highly correlated with each other (Mansfield and Helms, 1982). To detect multicollinearity, this study is employing a diagnostic test and technique by calculating the Variance Inflation Factors (VIF). If the mean VIF value is above 10, it can suspect multicollinearity. ***Table 14*** presents the multicollinearity test utilizing VIF. It shows there is no evidence of multicollinearity as the mean VIF is 4.07 which is far below 10. Therefore, it's confident that the panel regression model is robust, the coefficient estimates are reliable and meaningful, and the model accurately captures the relationships between the independent variables and the dependent variable.

Table 14. Multicollinearity Test

Variable	VIF
fcap	7.60
tfp	5.51
popgr	5.29
tro	4.75
sav	4.56
fdi	4.46

vol	3.75
pci	3.40
ppi	2.35
fxp	1.71
y2008	1.42
Mean VIF	**4.07**

Source: Author's construction

Chapter 5. CONCLUSION

5.1 Overview

This research investigates the relationship between China's outward foreign direct investment and economic growth of the Visegrád 4 countries. A literature review of the FDIs and economic growth nexus has been studied comprehensively. The study provisioned the mainstream theories of FDIs and economic growth from competing schools of thoughts. These theories provide an understanding of the channels in which FDIs promotes economic growth. The FDI and economic growth nexus is a field that have been studied extensively. However, these field provides less empirical studies about China's investments in the V4 countries. The study fills the gaps that exist in the literature and provides avenues for further studies. The focal point of the research is the effect of China's OFDI as a percentage of the total on V4's real GDP growth, and how this nexus is moderated by the productive capacities in each country of the Visegrád group. The sample period of the study is from 2004 to 2020. This is the period in which China's investment and economic cooperation in the V4 countries has taken a solid stance. To empirically understand how China's OFDI affect economic growth of the V4 countries, various research methods have been utilized. The models applied investigates the causality of FDI on real GDP growth. Firstly, the study utilizes panel data modelling which enables the calculation of the partial effects from heterogenous countries of the V4 group. In addition to the effects of China's OFDI, the effects of Germany, USA, and the World's OFDIs to the V4 have been estimated. These comparative assessments enabled a test of how the effects of FDIs can be generalized or differentiated. Secondly, the study utilizes the MSDR model which enables the estimation of the effects at different states of economic growth, the probabilities of transitioning between these states, and the duration it takes for real GDP to switch between transitions. Thirdly, the study reduces the variables into components by utilizing PCA. This helps obtain the most important information from the independent variables' data that is utilized to better explain FDI effects at different quantiles of real GDP growth. Fourthly, the study provides the expected effect in the short and long run by utilizing the CS-ARDL model. These fills the gap that exist in other models utilizes where the empirics generalizes the effects without stating the short and long run. From the four models that has been utilized, the conclusion of the findings, policy recommendations, and future research is provisioned in subsequent sections.

5.2 Main findings

The study concludes that the China's OFDI has a positive and significant effect on the V4's economic growth. The novelty of this research is the acknowledgement of productive capacities as a moderating factor between China's OFDI and economic growth of the V4 countries. Considering the productive capacities, China's OFDI affect economic growth positively. Productive capacities are significant in all sections of the findings. These suggest that productive capacities in the V4 countries are significantly important factors that explains the relationship between FDIs and GDP growth in the V4 countries.

Firstly, the paned data modelling was applied which includes FGLS, POLS, FE, and RE. The study reveals that all the four panel data models utilized postulate similar effects. The RE model has been chosen as the anchor model after diagnostic checks. The RE model finds that the net effect of China's OFDI on V4's economic growth is an estimated 0.20%. This is after accounting for the interaction between China's OFDI and real GDP growth of the V4. Since the statistical results are strongly significant, the conclude can be drawn that China's OFDI has a causal effect on the V4's economic growth. China OFDI contributes to the V4's economic growth by providing capital for new projects and businesses. China's OFDI also focuses on building infrastructure through its Belt and Road Initiative program. These developments enhance connectivity, facilitate trade, and improve the overall business environment. The investment in the V4 countries bring new technologies, management practices, and production methods. This contributes to innovation and the development of local industries. China's OFDI helps diversify the sources of investment and trade for the V4 countries, reducing their dependence on a limited number of partners. The study deployed an ad hoc analysis by estimating the effect of Germany, USA, and World OFDI to the V4. These OFDIs have a positive and significant effect. The net effect of Germany's OFDI on V4's real GDP growth is 0.15%, the net effect of USA's OFDI on V4's GDP growth is 0.13%, and the net effect of the World OFDI on V4's GDP growth is 0.10%. Panel data modelling have treated the four countries as group and hence provided a group mean estimate. In contrast, the MSDR model provides partial estimates of each country.

Secondly, the MSDR model finds that China's OFDI has a positive and significant effect in each country of the V4. The study postulates that China's OFDI has a positive and significant effect on the V4's economic growth, even after controlling for productive capacities. During

periods of economic slowdown or recession, the V4 countries face challenges in achieving robust economic growth due to various factors such as global economic conditions, financial crises, and internal economic issues. Lower global demand for goods and services may negatively affect the export-oriented economies of the V4 countries. In low growth periods, foreign investors might be more cautious, leading to a decline in FDIs inflows. Economic slowdowns can put pressure on government finances, limiting their ability to invest in infrastructure and development projects. Economic downturns can lead to higher unemployment rates and exacerbate income inequality, impacting overall economic stability. The V4 countries experienced economic challenges during the 2008 global financial crisis and the Eurozone crisis. Their ability to navigate and recover from these crises provides valuable lessons in crisis management and policy resilience. During times of economic expansion and favourable conditions, the V4 countries can experience strong economic growth. Strong global demand for V4 countries' exports can boost economic growth, especially if they specialize in high-demand industries. In times of economic optimism, foreign investors might see opportunities in the V4 countries, leading to increased FDI inflows. Investment in infrastructure projects can stimulate economic activity and productivity. Implementation of pro-business and market-friendly reforms can enhance competitiveness and attract investments. Access to European Union funds can support various development projects and regional initiatives, fostering economic growth. Embracing technological advancements and fostering innovation can boost productivity and economic performance.

Thirdly, the study utilizes PCA model which groups three components into "the dimension of China's OFDI" [*pc1*], "the dimension of Volatility of real GDP" [*pc2*], and "the dimension of the 2008 Global Financial Crisis" [*pc3*]. *Pc1* is the main variable of interest and it consists of China's OFDI, total factor productivity, fixed capital formation, trade openness, population growth, and producer price inflation. PCA model has attributed productive capacities to *pc2*. After creation of components, Quantile Regression model has been utilized to estimate effects of the components at the 25^{th}, 50^{th}, and 75^{th} quantile of real GDP growth. The study concludes that *pc1* has a positive and highly significant effect when real GDP growth is at its .50 and .75 percentile, and moderately significant at its .25 percentile. PCA postulates that effect of China's OFDI is large at lower real GDP growth level than in higher growth levels. This reflects an opportunity for China's investments to exerts its share in the marketplace and increase its efficacy on V4's economic growth. *Pc1* also concludes that its factors mentioned above are all significant in the promotion of economic growth. *Pc2* has a negative and significant effect when

real GDP growth is at its .50 and .75 percentile. Volatility reduces real GDP growth by a large percentage at lower levels of growth than in high levels of growth. *Pc2* is not significant when real GDP growth is at the .25 percentile. *Pc3* is not statistically significant at all levels of real GDP growth. However, PCA postulates that the global financial crisis reduces real GDP growth at higher levels of economic growth.

Fourthly, the research describes the short and long run effects of China's OFDI on V4's economic growth by deploying the CS-ARDL model. The conclusion is that China's OFDI has a positive and significant effect in both the short and long-run, even after controlling for the effect of productive capacities. All the covariates in the model have positive effect on economic growth except for producer price inflation, volatility of real GDP growth, and the global financial crisis of 2008. The novel contribution of the study postulates that productive capacities have a positive and causal effect on economic growth in the short and long run. Another conclusion can be drawn that productive capacities take longer to sufficiently increase economic growth in the V4 countries. China's FDI contribute to sustained economic growth by providing new capital to the domestic economies. This leads to increased real GDP growth and improved living standards over the long term. Long-term Chinese investments can lead to stronger economic ties and potentially influence diplomatic relations between China and the V4 countries. As members of the European Union, the V4 countries need to align their policies on FDI with EU regulations and policies. Long-term Chinese investments can have implications for EU-level discussions on trade and investment. Over the long term, China's investments in infrastructure projects can enhance connectivity within the V4 countries and beyond. This can contribute to regional integration and economic development. Therefore, this study can postulate that improved infrastructure resulting from China's OFDI can facilitate trade, reduce transportation costs, and boost economic activities in the long run.

China's OFDI into the V4 countries can bring about various opportunities that can benefit both China and the V4 countries. These opportunities can span economic, technological, and diplomatic dimensions. The expertise of China in infrastructure development, showcased through initiatives like the Belt and Road Initiative, could lead to significant investment in the V4 countries. This could result in improved transportation networks, energy projects, and connectivity that facilitate trade and economic growth. China's advanced manufacturing capabilities can provide opportunities for joint ventures or investments in manufacturing

facilities. This could enhance the V4 countries' production capacities and promote trade ties between China and the V4.

5.3 Contributions to the existing literature

This research contributes to the empirical literature of FDI and economic growth. There is a gap that exist which lies in how China's OFDI affect economic growth of the V4 countries. The study re-investigates the FDI-growth nexus in the post-socialist period of the V4. The use of Panel Data, MSDR, PCA, and CS-ARDL modelling provides rich empirical findings from these heterogenous countries. In all the models, the study finds a positive and significant effect of China's OFDI on V4's economic growth from a sample period 2004 to 2020. China's OFDI to the V4 may not be large as the investment by countries such as Germany and USA, but significantly contributes to economic growth. The study supports the findings by scholars who have found a positive effect while utilizing various research methods. A novel contribution to the FDI-growth nexus is the empirical application of productive capacities as a moderating factor. Various studies found productive capacities to be leading factors in attracting FDIs and promoting economic growth in CEE countries. However, empirical evidence has not been provided for the V4 countries, especially where productive capacities are measured as a composite index. Hence, the study contributes by adding an interaction term of China's OFDI and Productive Capacities Index (PCI) in the effect of China's OFDI and V4's economic growth nexus. The FDI-growth literature partially postulates a positive effect of productive capacities on economic growth without utilizing the PCI. These studies neglect that multiple productive factors moderate the FDI-growth nexus. This research also holds similar findings for the case of China's OFDI and V4's economic growth which is a phenomenon previously not researched comprehensively. And all productive capacities contained in the PCI significantly promote economic growth positively. The positive effect of China's OFDI on economic growth is also supported by the theoretical contribution of the Solow model, which describes that any form of capital, domestic and foreign, promotes economic growth.

5.4 Policy recommendations

The V4 countries have their own distinct FDI policies and regulations. While each country has its own specific policies tailored to its economic and political context, there are some common themes and areas of focus in their inward FDI policies. Given the strong efficacy of China's

OFDI in the V4, the governments and policymakers need to focus on strengthening productive capacities. Productive capacities make the FDI-growth nexus stronger in the long-run. This means that government and the private sector in the host country must increase investments in ICTs, economy's structure, human capital, natural capital, energy, transport, institutions, and the private sector. In addition, the V4 countries can establish or enhance Investment Promotion Agencies (IPAs) dedicated to promoting FDI from China. These agencies can provide information, support, and guidance to Chinese investors throughout the investment process. They could identify sectors that align with China's economic interests and strengths and focus on promoting those sectors to potential Chinese investors. This could include industries like manufacturing, technology, infrastructure, and renewable energy. They can develop targeted marketing campaigns that showcase the V4 countries' business-friendly environment, skilled workforce, strategic location, and access to broader European markets. They can design attractive investment incentive packages that align with Chinese investors' priorities. These could include tax incentives, grants, subsidies, and assistance with infrastructure development. They can strengthen bilateral agreements or treaties with China that provide a favourable investment climate and protect investors' rights. They can organize investor roadshows, trade missions, and investment conferences in China to directly engage with potential investors, business leaders, and decision-makers. They can provide streamlined administrative procedures for setting up businesses, obtaining permits, and navigating regulations. Hence, simplifying bureaucratic processes can encourage investment. They can highlight infrastructure projects that offer opportunities for Chinese investment, such as transportation, logistics, and energy. They can also leverage positive diplomatic and economic relations between China and the V4 countries to build trust and encourage investments.

5.5 Research limitations

In the overall study, data on factors such as the Covid-19 pandemic and the Russia-Ukraine war could not be utilized as these exogenous events falls outside the sample period of the paper. The study acknowledges that these events have had considerable impact on several economic variables from their time of occurrence. The impact of covid-19 on various sectors and industries is still being felt. The post-covid phases have been exacerbated by Russia-Ukraine war which led to inflationary energy prices across the V4 countries.

The study follows a research methodology of positivism which is mainly quantitative research. The idea of the study is that qualitative research of the nexus has been extensively conducted on FDIs and economic growth in the V4 region. Quantitative study has advantages about the availability of numerical data from official statistics. However, a well-planned qualitative study of a long-term horizon can accumulate information that can shed light on the China's OFDI and economic activities in the V4 countries.

The study estimates the effects utilizing China's OFDI as a percentage of total FDIs to the V4 countries. The use of this data is acceptable and provides an adequate justification of the dynamic of China's OFDI in the host countries. In other studies, OFDI as percentage of GDP is utilized. The China's OFDI as percentage of GDP to the V4 was not accessible during the study of this research. Once this data becomes available, it can assist in future studies.

5.6. Future research

Research on the China's OFDI and economic growth nexus in the V4 countries offers a rich area of study that can provide insights into the relationship between FDI inflows and the economic development of these countries. Considering future research in this area, the potential avenues to explore are to:

- Evaluate how recent exogenous shocks such as the Covid-19 pandemic and the Russia-Ukraine war affect the estimations in the China's OFDI and economic growth nexus.
- Investigate how China's OFDI impacts different sectors within each V4 country. It can examine whether China's OFDI has a differential impact on manufacturing, services, technology, or other sectors, and explore the reasons behind these variations.
- Explore the quality of FDI in terms of technology transfer, knowledge spill overs, and value-added activities. Assess whether China's OFDI is leading to upgrading and innovation within local industries.
- Evaluate the effectiveness of various FDI policies and incentives in attracting and maximizing the benefits of FDI. Assess whether changes in policy have led to shifts in FDI patterns within the V4 countries.
- Explore the macroeconomic impact of China's OFDI on variables such as GDP per capita, trade balances, and foreign exchange reserves, as well as the microeconomic dynamics within specific regions or industries.

- Examine the influence of political relations, international agreements, and geopolitical considerations of China's OFDI and their impact on V4's economic growth.
- Develop models that forecast the future trends of China's OFDI inflows and their implications for economic growth in the V4 countries, considering changing global economic conditions.

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