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**O IMPACTO DA QUALIDADE DA MOEDA NOS FLUXOS DE IDE NA ZONA EURO, JAPÃO E ESTADOS UNIDOS DA AMÉRICA**

**THE IMPACT OF THE QUALITY OF MONEY ON THE FDI FLOWS IN EURO AREA, JAPAN AND UNITED STATES OF AMERICA**

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Dissertação apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Economia (Dual Degree), realizada sob a orientação científica do Doutora Maria Elisabeth Teixeira Pereira, Professor Associada do Departamento de Economia, Gestão, Engenharia Industrial e Turismo da Universidade de Aveiro (Portugal) e da Doutora Violeta Pukeliene, Professora da Faculdade de Economia a Gestão da Vytautas Magnus University em Kaunas (Lituânia).

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**palavras-chave**        teorias da moeda, qualidade da moeda, IDE de entrada, IDE de saída, determinantes do IDE

**resumo**        A importância da entrada e da saída de IDE para a economia tem sido comprovada na literatura económica. As elevadas flutuações dos volumes de entrada e saída de IDE, desde 1997, e suas causas têm despertado um grande interesse académico e investigação nesta área económica. Constatou-se que uma série de fatores impactam os fluxos de IDE, sendo um deles a política monetária. No entanto, não há estudos que testem a relação entre a qualidade da moeda e o IDE. Assim, o objetivo desta dissertação é analisar aa relação em termos de entrada e saída de IDE na Zona Euro, Japão e EUA no período de 1999 a 2019. Para o estudo empírico, um indicador multidimensional da qualidade da moeda foi criado e seu impacto no IDE interno e externo foi testado empiricamente. Os resultados do indicador composto da qualidade da moeda revelam que durante o período em análise a qualidade do euro diminuiu, a qualidade do iene permaneceu quase inalterada e a qualidade do dólar americano aumentou. Os resultados do estudo empírico confirmam que existe uma relação estatisticamente significativa entre a qualidade da moeda e a entrada e a saída de IDE na eurozona Euro e nos EUA. Nenhuma relação estatisticamente significativa foi encontrada entre a qualidade do iene e o IDE interno e externo no Japão.

**keywords**          theories of money, quality of money, inward FDI, outward FDI, determinants of FDI

**abstract**          The importance of both inward and outward FDI for the economy has been proven in the economic literature. High fluctuations of the volumes of FDI inflows and outflows since 1997 and its causes have raised even a greater interest of scholars and researchers in the economic field. A number of factors have been found to have an impact on the flows of FDI, one of them being monetary policy, however, there are no studies testing the relationship between the quality of money and FDI. Therefore, the aim of this thesis is to analyse such relationship in terms of both inward and outward FDI in Euro area, Japan and USA in the period from 1999 to 2019. For the purpose of empirical research, a multidimensional indicator of the quality of money has been created and its impact on inward and outward FDI was empirically tested. The results of the composite indicator of the quality of money reveal that over the period from 1999 the quality of Euro has decreased, the quality of Yen remained almost unchanged, and the quality of US dollar has increased. The results of empirical study confirm that there is statistically significant relationship between the quality of money and both inward and outward FDI in Euro area and USA. No statistically significant relationship was found between the quality of Yen and both inward and outward FDI in Japan.

# Table of Contents

# List of Figures

# List of Tables

# List of Acronyms

| | |
|---|---|
| AHP | Analytic hierarchy processes |
| ATM | Automated teller machine |
| BOJ | Bank of Japan |
| CA | Conjoint analysis |
| CEE | Central and Eastern European |
| CISS | Composite Indicator of Systemic Stress |
| CIT | Corporate income tax |
| CPI | Consumer Price Index |
| ECB | European Central Bank |
| EU | European Union |
| EW | Equal weighting |
| FA | factor analysis |
| FED | Federal Reserve System |
| FDI | Foreign Direct Investment |
| GDI | Gross Domestic Income |
| GDP | Gross Domestic Product |
| HICP | Harmonized Index of Consumer Prices |
| IT | Information technology |
| M&A | Mergers and acquisitions |
| MCA | Multi-criteria approach |
| MMMF | Money Market Mutual Fund |
| MNE | Multinational Enterprise |
| OECD | The Organisation for Economic Co-operation and Development |
| OIS | Overnight index swap |
| OLS | Ordinary Lease Squares |
| PCA | Principal components analysis |
| R&D | Research and Development |
| REER | Real effective exchange rate |
| UAE | United Arab Emirates |
| UCM | unobserved components analysis |
| UK | United Kingdom |
| UNCTAD | The United Nations Conference on Trade and Development |
| US | United States |
| VAR | Vector autoregression |
| WB | World Bank |
| WLS | Weighted least squares |

# 1. INTRODUCTION

In the current world, globalization is a phenomenon providing unlimited business expansion and growth possibilities as well as access to international markets. Since it has become of such a great importance and relevance, it has also become a key topic of analyses and research. The investigation of its driving forces and determinants is one of the main objectives of such works.

There is a number of factors leading to globalization, but one of its key elements is foreign direct investment (FDI). It is a driving force for international economic integration, and it acts as a tool of creation of the long-term interconnections between the countries. FDI encourages the exchange of knowledge and technology between economies, also enables the host country to trade internationally. Moreover, it is another form of investment, which, if executed correctly, may lead to a greater expansion and development of the businesses (OECD, 2010).

Based on the statistical data presented by the World Bank (WB), the global trends of FDI net inflows and outflows have been volatile since 1997, reaching its peak in 2007, followed by the further fluctuations and decline from the year 2015, leading to the lowest point over a decade in 2018. Such a sharp decline was mainly caused by the tax reform introduced in the United States of America (USA) in 2017, which resulted in repatriation of funds held by USA companies in foreign jurisdictions (OECD, 2019). In 2019, however, both net FDI inflows and outflows started recovering.

Historical data shows that the trends of FDI flows may hardly be described as steady. Consequently, the causes of such fluctuations are of a great interest to scholars and researchers in the economic field. The examples of possible factors were found to be the countries' trade openness, political stability, the quality as well as cost of labour and other (Bobenič , Bruothová, Kubíková, & Ručinský, 2018).

It should be noted that FDI as an investment into a foreign entity is one of many economic transactions occurring on the daily basis. Sales, purchases, acquisitions, mergers and other internationalization forms are the usual daily transactions taking place in the economy. Transaction can be also described as an exchange of things between two or more parties (Merriam-Webster, n.d.). In order for the exchange to take place, the mean

of exchange – money, is used. That being said, FDI or cross-border investment transactions also involve money flows.

Money has a broad definition and a wide spectre of its use, but in general terms, it is a measuring unit of the value of the exchange of transactions (Guan, 2018). Modern monetary theories are usually focused on the quantity of money. The theory of the quantity of money was developed by David Hume in 1752 (Hume, 1752), then confronted by Adam Smith (1776), who gave rise to the theory of the quality of money, and it was further developed by Mill (1848) and Fisher (1911). The research on the effects of the latter is, however, limited. Therefore, the goal of this thesis is to contribute to the research on the effects of the quality of money and fill in the existing gap. It investigates and tests the importance of the quality of money on FDI in Euro area, Japan and USA. The reasoning behind such choice is explained in the further parts of the present thesis.

The **research problem** raised in this master thesis is the following: what impact has the quality of money on inward and outward FDI?

The **aim**: based on the theoretical analysis of the quality of money, to compose a multidimensional indicator, analyse the trends of this indicator in Euro area, Japan and USA and assess the impact of the quality of money on the flows of FDI in these countries.

The following **objectives** were formulated in order to reach the aim:

- analyze the theory of quality of money and FDI;
- summarize the research made on the factors affecting FDI and the impact of the quality of money on FDI;
- examine FDI statistics, trends and prospects;
- compose the multidimensional indicator of the quality of money and to assess the indicator evaluating trends and prospects in Euro area, Japan and USA;
- identify the most appropriate methodology for empirical study, perform the econometric analysis for the assessment of the impact of the quality of money on inward and outward FDI;
- estimate the impact of the quality of money on FDI flows in Euro area, Japan and USA;
- interpret the results of the assessment of the impact of the quality of money on FDI flows in Euro area, Japan and USA and formulate conclusions.

**Research methods.** First of all, the relevant literature is analysed and systematized. For the purposes of empirical research, a measure for the quality of money in the form of composite indicator is developed. Panel regression analysis is employed to test the impact of the quality of money on FDI flows in Euro area, and multiple linear regression analysis to test the impact in Japan and USA. The empirical research is performed using GRETL software.

**Information sources.** The data for the variables included into calculation of a composite indicator for the quality of money was collected from the official databases of the European Central Bank (ECB), Bank of Japan (BOJ) and Federal Reserve System (FED). Data on the FDI is from the statistical database of the United Nations Conference on Trade and Development (UNCTAD), and data on another macroeconomic variables is from the World Bank Database World Development Indicators.

For a better understanding and the overall consistency of the thesis, it is divided into several chapters. After the introduction, in Chapter two, the main theories and empirical studies of other scientists on the topics related to FDI and the quality of money are provided. Chapter three will cover the research methodology applied in the thesis, including the description of the data and its sources, the process of creation of multidimensional indicator as well as the methodology applied for testing the relationship between the quality of money and inward/ outward FDI. The results of the empirical research and their discussion will be presented in Chapter four.

Finally, the conclusions will be made and recommendations provided in the last Chapter of this thesis.

# 2.    LITERATURE REVIEW

In this part of the thesis, the literature covering the topic under analysis as well as relevant theoretical background will be discussed. ScienceDirect and Scopus databases were used as the main sources to look for the relevant articles and publications.

I will start this chapter by defining money, its value and presenting the two theories of money – the quantity of money and the quality of money. I will briefly discuss the differences between them and will focus on a more detailed analysis of the quality theory of money, which is of more interest and relevance for the topic of this Master thesis.

The second part of the chapter will be focused on the description of FDI, brief review of its trends in EU, Japan and USA and analysis of its importance for the economy. Finally, the theory of the quality of money will be linked to the FDI.

## 2.1.    Definition of money and its value

There is a number of possible ways how money is defined. Some of the examples are the following: something that is created by the law, medium of exchange enforced by the law, medium of exchange accepted by the society, and other (Mishkin, 2021). The general definition of money presented in majority of the textbooks teaching the principles of economics states that it is "*whatever serves society in four functions: as a medium of exchange, a store of value, a unit of account, and a standard of deferred payment*" (OpenStax Economics, 2016).

The function of acting as a standard of deferred payment means that something may be acquired today, but it should be acceptable for the payment to be fulfilled in the future. The meaning of the unit of account is as direct as it sounds – money is a measuring unit for other values. For example, 100 euros may be paid for the services of car maintenance, and the same 100 euros may be used to buy two watches each worth 50 euros (OpenStax Economics, 2016).

The function of the money as a store of value signifies that money does not lose value as fast as other things do. It allows the market participants to hold money until there is a need or desire to spend it. It should be, however, noted that money is not the only good that can store value. The examples of others are jewelry, property, stocks or other. The latter are also considered as a better store of value than money since they bring greater

returns and can even appreciate in value. On the other side, the advantage of money as a store of value is in its liquidity, i.e. how easy and quickly it can be exchanged for another good. This is also the main reason of market participant choosing it for this function over other assets (Mishkin, 2021).

The function of money acting as the medium of exchange entails that money is an intermediary in transactions between the parties involved, or in other words, it is used as a mean of remuneration in the scope of transaction performed (OpenStax Economics, 2016). This function enables transactions between the market participants without the need to satisfy the double coincidence of necessities and allows the specialization of labour, the increase of exchanges and the decrease of transaction costs (Mishkin, 2021).

It should also be noted that a number of scholars consider the latter function as the only one and essential function of money, all the others being as additional non-necessary functions (e.g. Menger, 1871; Mises, 1953 and 1998; Rothbard, 2004). To be more specific, Mises (1998:401) has stated that "*Money is the thing which serves as the generally accepted and commonly used medium of exchange. This is its only function. All the other functions which people ascribe to money are merely particular aspects of its primary and sole function, that of a medium of exchange.*" However, Bagus (2009) argues that such a statement neglects the importance of money's function as a store of value, the changes of which have an effect on the demand for money. Historically, the economists like Marshall (1871), Marshall and Marshall (1879) and Pigou (1917) have also highlighted the importance of the money's function as a store of value.

Another term that should be explained before going into details of the theories of money is the value of money. Its definition, however, may be very broad. Various economists have defined it differently: some explain the value of money through the values of the precious metals such as gold and silver, others express it as the value of local currency against the foreign ones (i.e. exchange rates). However, as discussed above, the primary function of money is acting as the medium of exchange, which is used to purchase goods and services. Therefore, the general definition of the value of money is its purchasing power, or in other words, the quantity of goods and services that can be purchased with one unit of money divided by the general index of prices (M/P).

It would also be convenient to highlight the difference between two important concepts to understand money, which are the value of money, measured by the purchasing power

(M/P), and the price of money or the so-called cost of opportunity expressed by the interest rate (i).

## 2.2. Theories of money

***Quantity theory of money.*** The quantity theory of money is one of the mostly discussed theories of money among the economists. It is considered that the traditional quantity theory of money has originated in the 15th-17th centuries as a result of the extreme price fluctuations. As explained by Hayes (1989:30): "*This period was characterized by debasement of the currency in the form of official devaluations and fraudulent clipping by individuals combined with a considerable influx of American gold and silver. These developments were compounded by the fact that such extra monetary units were promptly spent on wars which simultaneously interfered with the production process. These factors combined to provide economic observers with the phenomenon of rapidly increasing prices*".

Although formulated early, the traditional quantity theory of money was actually developed in the late 19th and early 20th centuries by such scholars as Newcomb (1885), Foville (1907), Fisher (1911), Mises (1912). The main idea behind the theory states that the changes of the prices of the goods and services correspond to the changes in the supply of money. Meaning that the more money is in circulation, the higher would be the level of prices and vice versa and such dependence is proportional. The equation that represents the quantity theory of money is the following:

$$MV = PT,$$

where M – quantity of money,

V – velocity of money[1],

P – price level, and

T – volume of transactions.

The above-described quantity theory of money is often referred to as the transactional theory. The main criticism that it receives is, however, not for the undertaken assumptions but for the fact that all of the transactions are treated as being equal when in reality several

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[1] The frequency of the exchange of money in the economy, i.e. the rate at which market participants spend money (Kenton, 2020).

types of transactions (e.g. purchase of raw materials, purchase of final goods and services, investments, etc.) may be distinguished each having different terms and periods of payment (Hayes, 1989). Thus, the final measure consists of a number of factors and is of a relatively abstract nature.

As a result, an alternative approach to the transactional quantity theory of money had been proposed which was mainly focused on the transactions involving the purchase of the final goods and services – the income approach. The main difference from the transactional theory is that this approach shows the changes in quantities and prices in terms of the real output of the economy as compared to the abstract indication consisting of the total number of transactions performed. However, it has been also treated as a disadvantage of this approach. Since both capital transactions and purchase of intermediate goods may impact the demand for money, it has been under a great debate whether the measure not taking them into account is appropriate in this case.

Another alternative approach to the quantity theory is the one which is different from the previous two approaches and is called "the Cambridge Cash Balance" approach (Pigou, 1917; Marshall, 1923). The transactional and income approaches focus on the function of money as the medium of exchange, while the cash balance approach stresses the function of storing the value. As explained by Hayes (1989:31), the general assumption under this approach is "*that the amount of money that people will wish to hold as a temporary store of purchasing power will be related to the real income of society as this limits the volume of potential purchases available to society*". The similarity of this approach and the other two discussed earlier is that all of them consider the velocity of money to be constant.

It should also be noted that the quantity theory holds true if the following assumptions are met: 1) the velocity of money is constant over the short-term period and 2) full employment[2] is present in the economy.

The first assumption is based on the fact that velocity of money depends on the habits of households and businesses, institutions and the operations of the banks and all of these does not change significantly over a short run. The second assumption is related to the fact that in the environment of the full employment it can be assumed that the level of transactions remains relatively unchanged, meaning that people will remain employed

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[2] The situation when the unemployment rates are at the lowest levels and there is no involuntary unemployment (Rees, 1957).

and will perform the same number of transactions over the specified period of time. Therefore, if the listed assumptions are met, the relationship between the supply of money and price level should be directly proportional (Hayes, 1989).

However, these assumptions are hardly to be true in practice, and consequently, they are the reason for the criticism that the theory has received. One of the greatest critics was Keynes (1936). He concluded that the quantity theory might be accurate in the long-run, but not over the short-run since both velocity of money and output are highly variable. If looking at the definition of the velocity of money, it is highly impacted by the decisions of people. If people decide to spend more, the velocity increases and vice versa. There may be a lot of factors that can influence the decisions of people related to their spending and in turn result in the changes in velocity of money. Thus, Keynes (1936) states that the quantity of money in circulation has low to no impact on the changes in prices.

Based on that, Keynes reformulated the theory. His main argument is that the prices are not directly affected by the quantity of money, but through a chain of other factors. First of all, the increase or decrease of the money quantity may result in a change of interest rate. This change, in turn, may lead to increase or decrease in the volume of investment, which may then influence the level of employment, income and output as well as the production cost. At the end, the combination of these factors will result in the changes of the level of prices (Keynes, 1936).

In response to such conclusions, the traditional quantity theory of money was later restated by Friedman (1956). Friedman (1956) notes that under the Keynesian view, velocity of money was a passive function, i.e. if the quantity of money increased, velocity would decrease. Friedman (1956), however, finds an empirical evidence for the contradicting view proving that when the quantity of money increases, velocity rises as well and vice versa. Finally, Friedman (1956) concludes that "*it has increasingly become the generalization that changes in desired real balances (in the demand for money) tend to proceed slowly and gradually or to be the result of events set in train by prior changes in supply, whereas, in contrast, substantial changes in the supply of nominal balances can and frequently do occur independently of any changes in demand. The conclusion is that substantial changes in prices or nominal income are almost always the result of changes in the nominal supply of money*" (Durlauf & Blume, 2016:301) The restated theory is currently often referred to as the modern quantity theory.

However, the problem of the restated quantity theory, and the quantity theory in general, is that it does not take into account the determinants influencing the demand side for money. This is sustained by the sentence: "*While such an analysis is not obviously incorrect, the attention the equation affords to past quantities, both of money and nominal transactions, obscures the real problem at hand regarding the value of and demand for the monetary unit*" (Bagus & Howden, 2016:4).

***Analysis of the demand for money.*** Hendershott (1969) has argued that focusing purely on the quantity theory of money while analysing how monetary policy affects the economy is not completely correct. He, however, explained that the focus on the quantity theory is due to its simple nature and historical correlations between the supply of money and output. Hendershott (1969) has also found evidence that it is not the changes in the supply of money that affect the changes in output, but the actual causality is the opposite.

Scholars usually omit the demand side of analysis from their research due to the subjective nature of its determinants. A number of economists, mainly representing the Austrian school view, argue that indeed the value as well as demand for money are subjective, however, the changes in prices cannot be explained only through the supply of money.

The demand for money may be influenced by a number of factors, e.g. increase or decrease of population, seasonality of payments, changes in the division of labour, etc., that may be treated as objective, however, the influence of these factors on the demand for money is based on the judgments of market participants that are subjective in nature. (Žukauskas & Hülsmann, 2019). The subjectivity of the demand for money is related to the fact that it is treated as a good (Friedman, 1957). Goods are demanded based on the needs of market participants and based on the value that they bring to market participants. Money as a good has the capacity to provide services to its users, i.e. to acquire other goods or services that are needed. Due to the fact that money can be held for a long period of time, it gives the possibility to acquire at the most appropriate time – when the good is the most necessary or the acquisition is the most profitable.

The models of neoclassical and Keynesian economic thoughts present the interest-bearing securities as the only opportunity cost of holding the money. However, Horwitz (1990) claims that such approach is over-simplified and argues that the choice of the market

participants whether to hold money or not depends on the opportunity cost of the forgone alternative which is the most valuable among all existing alternatives: "*When an actor is facing a decision to hold wealth in the form of money, she is deciding between a number of prospective utility streams. We can broadly categorize those streams as the utility from non-financial assets and the utility from both the availability and interest returns from non-money financial assets*" (Horwitz, 1990:465).

Another reason for the subjectivity of the money's demand is the choice of the user. The right of choice on how to use the money lies upon the person possessing it, and only this person is able to evaluate the utility that such choice provides to him. Such assessment will, however, be always subjective, because it will be based on the personal experiences, needs and wants and will differ from one person to another.

Coming back to the monetary policy, the demand for money may also be influenced by the income of market participants, prices, interest rates, etc. Consequently, by presenting changes to the monetary policy (having in mind here not only changes in interest rates or the supply of money), central banks may have an impact on the people's choices related to the amounts of money that they wish to hold as well. "*The subjectivist approach to the demand for money allows us to recognize that the impact of central banks on money (and prices) may be much broader. And this is exactly what recent literature claims on the quality of money*" (Žukauskas, 2020:172).

*Quality theory of money.* Although not as popular as the quantity theory of money, the quality theory has also been researched by a number of economists. The majority of such researches are aimed at identification of the factors influencing the money's quality. Mariana ([1609] 1994) and Petty ([1662] 1889) associate the deterioration of the quality of gold coins with taxes. Smith ([1776] 1904) distinguishes qualities such as durability and divisibility as the important ones. Other authors, such as Say ([1802] 1855), Senior ([1850] 1853), Mill ([1848] 1965), Jevons (1875), Rothbard (2008), have also analyzed the qualities that the good money must possess and those may be summarized into the following: utility and value, portability, durability, divisibility, homogeneity, stability of value, cognoscibility (Bagus, 2009). This aspect is also highlighted in the Law of Gresham (Rolnick & Weber, 1986; Bofinger, 2001). The Gresham's Law is a monetary principle stating that "bad money drives out the good one" of circulation.

The meaning of **utility and value** is best described by Jevons (1875:32): "*Since money has to be exchanged for valuable goods, it should itself possess value, and it must therefore have utility as the basis of value. [...] When once a substance is widely employed as money, it is conceivable that its utility will come to depend mainly upon the services which it thus confers upon the community. [...] In order that money may perform some of its functions efficiently, especially those of a medium of exchange and a store of value, to be carried about, it is important that it should be made of a substance valued highly in all parts of the world, and, if possible, almost equally esteemed by all peoples*."

**Portability** of money implies that it is not too heavy to carry, easy to transport and transfer from one person to another. The importance of this quality has been proven by firstly the coins and paper money becoming popular among users once they were introduced, and in more recent decade – bank cards, integration of payment functionalities into smart devices, etc. The portability of money is also important for international transfers. The more portable it is, the lower is the cost of transfer. And the lower is the cost of transfer, the higher is the engagement into such transfers.

Money should also be **durable**, i.e. it should not be easily destructible. For example, previously such items as eggs, oil and other food products were used as a currency, however, given their low durability, the valuation of such currency had raised a number of issues, since one day the food is used as a mean of payment, but next it is eaten up. As a result, it is impossible to hold a large stock of such currency at hand and its value must be fluctuating a lot (Jevons, 1875).

**Divisibility** of money entails its ability to be easily divisible into pieces of different sizes, but with the same value both for the aggregate value before and after division (Fernandes, Pereira, Bento, Madaleno & Robaina, 2021). Which means that 20 euros divided into two banknotes of 10 euros each will still be 20 euros, while in the case when, for example, the piece of closing is used as a payment, its value would significantly drop if that piece is cut into several ones. **Homogeneity** of money is closely related to the divisibility. The main idea here is that the counting units must be similar/equal, i.e. two banknotes of 10 euros each will always be equal to 20 euros or two banknotes of 5 euros will be the same value as 10 euros, etc. (Abraham, 2013).

The **stability of value** is another desirable quality of money, especially when the money is used as a store of value. If the value would be subject to volatile fluctuations, it would

negatively affect the long-term contracts and would demotivate market participants to enter into them. And, since majority of the contracts in the economy are long-term (even speaking about FDI, the transaction is performed with a long-term goal in mind), their decrease in number would most probably have negative effects on the economy (Abraham, 2013).

**Congnizability** of money means that it should be easily recognizable and distinguishable from other items, so that people using it for exchange do not face additional challenges with its valuation, weighting, testing, etc. In essence, once money is received, its value should be recognized immediately without additional procedures to be performed (Abraham, 2013).

Additionally to the features discussed above, the following qualities of the good money were identified in more recent literature (mainly by Bagus, 2009): the number of users (the greater amount is considered to be better), ability to increase in quantity, financial system's stability, governmental intervention in money management (less intervention is considered to be more beneficial). According to Jevons (1875), different functions of money dictate the properties that it must possess. Therefore, deciding the universal qualities of good money may be a complex exercise. If looking at the two main functions separately, when it comes to money as a medium of exchange, portability and divisibility are the most relevant qualities of good money. When, however, it comes to money as a store of value, such qualities as stability of value, durability and some level of portability become the main ones (Jevons, 1875).

Nevertheless, notwithstanding the fact that the factors of the quality of money have been widely analyzed, its importance for and impact on the demand of money have been rarely mentioned. The general quality theory of money states that the quality of money affects the demand for money. Bagus (2009:22-23) defines the quality of money as "*the capacity of money, as perceived by actors, to fulfil all its main functions, namely to serve as a medium of exchange, as a store of wealth, and as an accounting unit*". Žukauskas and Hülsmann (2019:129) broaden this definition by stating that *"[...] the quality of money is one of the important factors, along with uncertainty, financial innovations (credit cards, automated teller machines (ATMs), Money Market Mutual Funds (MMMFs)), frequency of payment, etc. that affect the reservation or cash-balance demand for money*."

Based on the quality theory of money, the supply of money is one of the determinants having impact on the quality of money. However, as a determinant it is only important when the analysis is performed over a period of time, but not at the specific one point in time. This is due to the fact that money supply will not change at one point of time and during that point the amount of money in circulation would be irrelevant for the quality of money. If, however, money's quality is analyzed over a period of time, changes in the money supply become relevant. The relevance comes from the fact that fluctuations of money in circulation affect the purchasing power of money, i.e. the more money is in circulation, the lower is the purchasing and vice versa. Frequent changes in money supply lead to instability of the purchasing power which decreases the quality of money (Žukauskas, 2021).

As mentioned, the main concept of the quality theory is the ability of the banks to influence not only the money supply, but also other features of money that are considered to be important by the market participants. The changes of such features are expected to affect the quality of money, which in turn would affect its demand and also the purchasing power of money.

Based on the theory of Böhm-Bawerk (1884), the determination of the prices is influenced by the value of money ascribed by the potential sellers and buyers in terms of the value of the goods and services that can be exchanged for that money. Such valuation performed by the market participants is also affected by the quality of money. As stated by Bagus (2009:29), "*The higher the quality of money is, the more buyers and sellers of money value the monetary unit in relation to other goods and services. The lower the quality of money is, the less buyers and sellers of money value the monetary unit in relation to other goods and services*". In essence, this means that the purchasing power of money might fluctuate due to the changes in the quality of money even if the quantity of both money and goods and services remains constant.

As it has already been stated above, the changes to the quality of money influence its purchasing power through its impact on demand. The change in the quality of money also means that the same amount of money held by a market participant would be valued by him differently. The subjectivity of such personal valuation may lead to a very sudden changes in the level of the quality of money (given that people's opinions are prone to sudden changes that are result of various external influences). In comparison, the quantity

of money cannot be influenced this quickly, thus the changes are generally more predictable.

***The impact of the quality of money***. The literature exploring the impact of the quality of money on different areas of the economy is very scarce. In majority of the analyses on the impact of monetary policy on economic development, the authors take into account mostly the supply side factors such as the case of interest rates.

One of the most recent studies was performed by Žukauskas (2021). He has explored the impact of the quality of money on the prices of financial assets. The results of his empirical study show that the quality of Euro currency has decreased over the period from 1999 to 2019. As a consequence, the demand for money has also reduced. However, assuming that financial assets are treated as a substitute for money in its function of storing the value, the demand for financial assets increased, also raising the prices of these financial assets.

Nevertheless, the results of his empirical study reveal positive and statistically significant relationship between the prices of financial assets and the quality of money in a short run. This could be explained through the concept of financial repression, i.e. when the government seeks to gain access to capital markets at more favorable credit conditions. The short-term consequences of financial repression result in lower attractiveness, which is related to lower expected return, of having financial assets, hence the demand for both financial assets and money is affected negatively. On the other side, when poor quality of money remains in the long term, market participants tend to choose financial assets over money as a mean of storing the value (Žukauskas, 2021).

And although the empirical results obtained by Žukauskas (2021) are not of a major relevance for the purpose of this thesis, they are presented as the evidence of the employability of the composite indicator measuring the quality of money developed by the author. This Master thesis is aimed at broadening the application of the mentioned composite indicator while trying to find the inter-connection between the quality of money and the FDI flows.

## 2.3.     The concept of FDI and its recent global trends

An upward trend of the volumes of FDI flows may be observed starting from 1990s. The increase of the volumes, however, is not steady, i.e. during these past 20 years, there were both the highest and the lowest points in FDI statistics. Consequently, this has drawn an attention of scholars leading to a number of econometric studies aiming to identify the effects of FDI on the growth and development of participating countries. Based on the theory of neoclassical growth models, FDI being an exogenous factor may contribute to growth through the increase of the volumes or efficiencies of investments (Solow, 1956; Sala-i-Martin, 1996), while based on the endogenous growth models, transfer of technology, diffusion and spillover effects are the factors leading to economic growth (Lucas, 1988; Romer, 1986).

The definition of FDI used in the literature most often has been provided by Farrell (2008:5) and is the following: FDI is a "*package of capital, technology, management, and entrepreneurship, which allows a firm to operate and provide goods and services in a foreign market*". According to Smith (1997), FDI acts as a tool for filling the gaps in development that exist between developed and developing countries by enabling local firms of the host countries to carry out investment projects through provision of access to additional capital, by transferring the know-how and skills from developed countries to developing ones, also by the increase of the tax revenues in the host country from activities performed in that country by the foreign entities.

Consequently, FDI is considered as one of the factors contributing the host country's economic growth and development (Baiashvili & Gattini, 2019). This has also been confirmed by the majority of the studies performed since 1990s when FDI flows started increasing in volume (Pack & Saggi, 1997; Greenaway, Pfaffenzeller, & Sapsford, 2007). More recent studies, however, confirm that the actual effectiveness of FDI depends on a number of factors present in the host countries, including its political stability, social environment, education level and other, all together referred to as absorptive capabilities (Crespo & Fontoura, 2007; Meyer & Sinani, 2009; Baiashvili & Gattini, 2019).

***Recent global trends in FDI flows.*** The trends in global FDI flows have not been very positive in the couple of recent years. Statistical data shows that starting from 2015, the trend is going downwards consistently. Despite the fact that in 2019, the average of the

global inward and outward FDI flows grew by 12% as compared to the previous year, its portion as a percentage of gross domestic product (GDP) is at the very low levels. In 2019, FDI flows accounted for only 1.6% of GDP. In comparison, in the period from 2015 to 2017, they accounted for more than 2% of GDP (Figure 1). Moreover, it can be seen from Figure 1 below that in 2018-2019, FDI flows as a % of GDP were at the lowest point since 2003 (OECD, 2020).
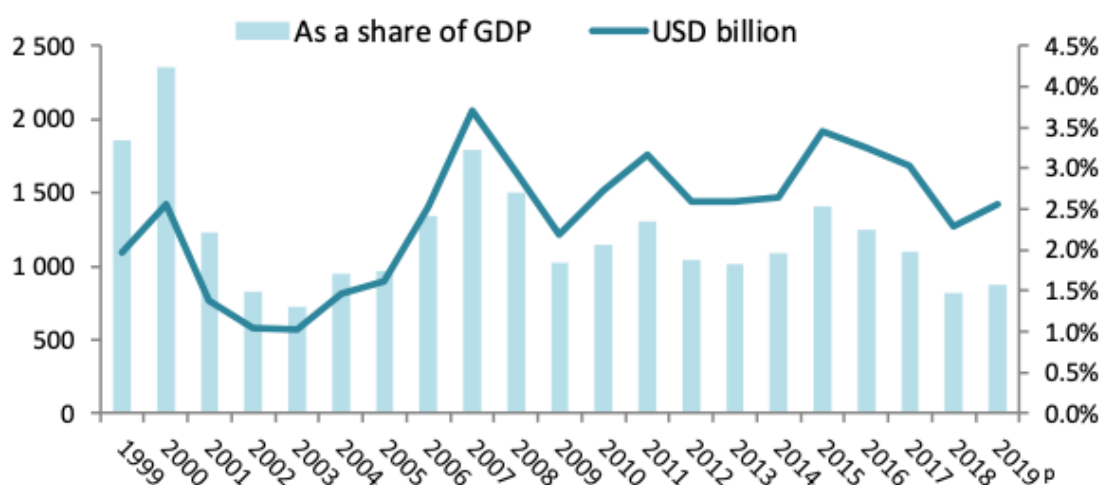


*Figure 1.* **Global net FDI flows, 1999-2019**
*Source:* OECD International Direct Investment Statistics database (OECD, 2020)

The sharp decrease of FDI flows in 2018 (by 27% from the level of 2017) was caused by the tax reform introduced in the USA, which prompted USA's multinational enterprises (MNEs) to repatriate funds held in foreign affiliates. This effect has been seen as the short-term at first, since similar situation occurred in 2005, but the levels of FDI recovered quite quickly then and thus the same was expected in 2018 as well. However, the actual data shows that the situation might be different this time. There are no signs of the fast recovery and reinvestment of USA MNEs currently. On the contrary, the new forecasts show that the slowdown in FDI flows may be for a longer period (OECD, 2019).

Moreover, based on the report presented by the UNCTAD, global flows of FDI are expected to further remain at low levels in 2020 and 2021. The preliminary data shows a drop of 42% in 2020 as compared to 2019. This is the lowest point observed during the last 20 years, even the global financial crisis of 2008 did not result in such a sharp decrease. The key cause for a decrease is the uncertainty raised by the COVID-19 pandemic and its further evolution (UNCTAD, 2021). The findings presented in the UNCTAD's report show that the greatest decrease of FDI flows is observed in developed

countries, the flows decreased by 69% there. The flows to developing countries, on the other side, decreased by 12% (UNCTAD, 2021).

## 2.4.  Determinants of FDI flows and its effectiveness

As it can be seen from the information provided in the previous section, the trends in FDI flows are quite volatile. In the previous 20 years, the countries experienced both the highest peaks and the lowest points of the flows of FDI. And since FDI is believed to be one of the drivers of economic development, but the trends of flows are changing so often, its causes and determinants have been of elevated interest to economists. Numerous scholars have performed the research in order to find the key factors influencing and determining the flows and effectiveness of FDI (e.g. Hintošova et al., 2018; Adegboye et al., 2020; Ashurov et al., 2020).

*Effectiveness of FDI.* Before going into a detailed analysis of determinants of FDI, it is useful to briefly discuss its importance and effectiveness in the host countries, meaning its contribution to the recipient country's economic growth. A major part of empirical studies argues that FDI can contribute to the economic growth of the recipient country only when such country is able to absorb the advantages that the FDI brings, or in other words, it has relevant absorptive capacity (Crespo & Fontoura, 2007).

The term of absorptive capacity is usually used to describe the firm's ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends, which also contributes to its innovative capabilities (Cohen & Levinthal, 1990). However, it may also be applied when discussing the effectiveness of FDI in the recipient countries in such a way that the recipient country should be able to recognize the value of the investment received and apply the gained knowledge in practice in order to derive as much benefits as possible from it and boost the economic growth.

Absorptive capacity of a country is expressed through a number of indicators, such as the quality of institutions, maturity of financial markets, innovation capabilities, technological gap between the home and host countries, and also some that have been listed as determinants for FDI flows, e.g. trade openness, educational level of human capital, have an impact on its effectiveness as well (Glass & Saggi, 1998; Crespo & Fontoura, 2007; Baiashvili & Gattini, 2019).

The results of the research of Borensztein, Gregorio and Lee (1998) on the impact of FDI on economic growth confirm that FDI contributes to the host country's economic growth more than domestic investment, however, this holds true only if the host country has sufficient absorptive capacity in a form of the stock of human capital, meaning that the host country must have sufficient level of human capital in order for FDI to be effective in boosting economic growth. For the purpose of this research, the authors used data on FDI flows to 69 developing countries from a sample of chosen industrial countries in two periods – from 1970 to 1979, and from 1980 to 1989. A panel regression analysis was employed in the empirical part of their study (Borensztein, Gregorio, & Lee, 1998).

Chloe (2003) used a sample of 80 countries with the data for the period from 1971 to 1975 and employed a panel vector autoregression (VAR) model to explore the relationship between gross domestic income (GDI), FDI and economic growth. The results show that FDI flows affect the economic growth of the host countries, however, econometric outcome suggests that economic growth of a host country has an impact on FDI inflows into that country. Therefore, the author concludes that statistically strong positive relationship exists between FDI and economic growth, however, the mere existence of FDI inflows does not boost the growth. The author stresses that economic, political and social stability is crucial for FDI to be effective (Chloe, 2003).

Hermes and Lensink (2003) provided empirical evidence that the development of the financial system of the host country also has an impact on the effectiveness of FDI in terms of that country's economic growth, i.e. the more developed the financial system is, the more FDI contributes to the economic growth of such country. For their research, the authors used the data for 67 less developed countries over the period from 1970 to 1995 and employed the panel regression analysis. Financial development was measured by the ratio of the private bank loans to GDP (Hermes & Lensink, 2003).

Similar findings were presented in the study of Alfaro, Chanda, Kalemli-Ozcan and Sayek (2003). Data on 39 countries, over the period from 1981 to 1997, was used in the research. The sample of countries consisted of those with high and low-income levels as well as different levels of financial development. The authors constructed several models representing different series of financial markets, i.e. stock market, liquidity in the market, private credit. The results prove that development level of financial markets in the host countries indeed is a precondition for FDI to be effective in terms of economic growth.

The empirical evidence also shows that there is a threshold for the development level of financial markets, and if it is not reached FDI will not contribute to growth (Alfaro et al., 2003).

Another study performed by Busse and Groizard (2008) suggests that not only regulations in financial markets, but also other governmental regulations affect the FDI's contribution to the economic growth in the host country. The results of the empirical research performed by the authors on 89 countries prove that excessive government regulations in the recipient countries decrease the effectiveness of FDI (Busse & Groizard, 2008).

***Determinants of inward FDI.*** The results of empirical studies discussed in the previous section prove the relevance and importance of FDI for the economic growth of the host countries. Consequently, the aim of the host countries is to attract as much as possible FDI into their countries. For this purpose, a number of measures and policies are being implemented. However, in order for the country to know exactly what attracts FDI, the studies aimed at identifying its determinants have been performed.

In one of the early studies performed by Lansbury, Pain and Smidkova (1996), the authors explored the FDI flows from fourteen members of the Organisation for Economic Co-operation and Development (OECD) to Hungary, Czech and Slovak Federal Republics and Poland in the period from 1991 to 1993 and found that research intensity, relative labour costs and privatization schedule have a positive impact on inward FDI flows into those countries.

Another study carried out by Bevan & Estrin (2000) found that the key determinants of inward FDI into Central and Eastern European (CEE) countries are the labour costs, distance between the host and source country and the host country's size and risk assertion. Galego, Vieira and Vieira (2004) concluded that trade openness, potential demand for the new goods and/ or services and the labour costs as well positively affect the inflows of FDI into CEE countries. Janicki and Wunnava (2004) explored the factors influencing FDI flows into several EU countries and found that trade openness, market size and labour costs have a significant positive effect on FDI.

Later Riedl (2010) found that industrial concentration and GDP determine the FDI flows into the eight EU countries that became members in 2004. Interestingly and on the contrary to the previous studies, the author found a negative impact of labour costs on

FDI. As it will be seen from the further studies, this finding may be related to the fact that more recently investors value the educational level more than a cheap labour force, and consequently, invest into countries with a more expensive labour force. Moreover, the countries analyzed by Riedl (2010) are known for their developed industrial and information technology (IT) field, and investments into that field are most certainly not aimed at cheaper production and development costs.

Chanegriha, Stewart and Tsoukis (2017) performed a study covering 168 worldwide countries, in which 58 potential political, geographic and economic factors influencing FDI were considered. The following determinants were found to be positively correlated with FDI: school enrollment into secondary and tertiary levels, trade openness, corporate income tax (CIT) rate, government spending and outgoing FDI. Inflation, on the other side, was found to have a negative effect on FDI.

As for the more recent studies, Hintošová, Bruothová, Kubíková and Ručinský (2020) performed an ordinary least squares (OLS) and fixed-effects regression analysis using a country level data for Visegrad[3] countries for the period from 1989 to 2016 and found that the level of gross wages and proportion of educated labour force have a significant positive impact on FDI inflows into Visegrad countries. While expenditure on research and development (R&D), trade openness and CIT rate were found to have a negative effect on FDI.

Ashurov, Othman, Rosman and Haron (2020) investigated the determinants of FDI into some of Central Asian countries. The data covering the period from 2000 to 2017 was used for the purpose of this research, and the panel quantile regression was employed. Such determinants as trade openness, available labour force, total tax rate, GDP and FDI of the previous year were found to be statistically significant with a positive effect on FDI of the current year.

Adegboye, Osabohien, Olokoyo, Matthew and Adediran (2020) analyzed the determinants of inward FDI into 30 countries of sub-Saharan Africa for the years from 2000 to 2018. Fixed and random effects models were employed by the authors, and the results revealed that the quality of institutions is the key element determining the FDI flows into the chosen countries. Moreover, the authors looked at the importance of foreign

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[3] Visegrad countries include: Czech Republic, Hungary, Poland and Slovak Republic.

capital for the economic development of countries of sub-Saharan Africa and found that it is crucial for these countries.

To sum up everything that has been stated above, the majority of empirical studies conclude that the key determinants of FDI are trade openness, labour costs and education level of the labour force, tax rate and general level of economic development (represented by GDP per capita). The reasons for such factors appearing to be determinants of FDI are quite obvious:

**Trade openness.** Investors transferring their money into foreign markets expect to obtain some benefits out of such investment, either it would be increased profits, reduced costs or tax benefits. If investor faces the challenges for trading, it could act as a demotivational factor for his investment. For example, a firm wants to establish its manufacturing facility in a foreign country with lower costs. Such investor will of course choose the country which is more open to trade in order for him to be able to transfer his firm's production either back to the source country or sell it to other countries.

**Labour costs and education level of the labour force.** As the results of empirical studies suggest, the lower the labour costs, the more attractive seems the country to investors. However, this is not always the case. As found by Riedl (2010), in some cases, labour costs have the opposite effect on FDI. Mostly it occurs, when the investor's aim is not to reduce costs, but invest into a country which has greatly developed field which investor is interested in. In such cases, the aim of investor is to produce superior quality goods or provide superior quality services, notwithstanding the fact that it may result in higher costs. In these situations, the priority of the investor is the level of education of the labour force in the host country. The more educated is the labour force, the more probable is that this country would be chosen for the investment.

One of the examples for such investments is Lithuania. Labour force is not the cheapest there, and payroll taxes are among the highest in Europe, however, such worldwide known companies as Nasdaq, Cognizant, Western Union, Hollister, Continental and many more has chosen Lithuania as their investment target. And it is due to the highly educated labour force as well as their innovative and flexible mindset (Invest Lithuania, 2020).

**Tax rate.** Tax rate was found to have a negative effect on FDI and the particular reason for that is that investors would choose a country with more beneficial tax regime over the one that does not provide for any tax reliefs or reduced rates.

*Determinants of outward FDI.* While determinants of inward FDI are the characteristics of the recipient country, factors influencing outward FDI should be observed in the investing country. These factors were also attempted to be discovered by a number of empirical studies. In general, they can be summarized into two categories – country-level and firm-level factors. Since the study of this thesis focuses on the country-level analysis, firm-level factors will not be discussed due to their irrelevance. It should also be noted that determinants of outward FDI from developing countries have been explored more often than from developed countries due to the fact that volumes of outward FDI from emerging economies have been rising more rapidly than those of developed economies. Nevertheless, both show similar results.

Country-specific factors were analysed by Das (2013) in his study on developing countries. He performed a panel regression analysis using data for a large number of developing countries for the period from 1996 to 2010. The results show that determinants of outward FDI are the following: political risk, globalisation, level of the economic development and R&D investments (Das, 2013). Another study on factors influencing FDI outflows from emerging economies was performed by Cieślik and Tran (2019). Their sample data consisted of 38 developing countries (investors) and 134 host countries. The period of the analysis was from 2001 to 2012. Authors conclude that the size of the market, abundance of skilled-labour, distance between the home and host countries, cost of investment and cost of trade are the determinants of outward FDI (Cieślik & Tran, 2019).

The results of the panel regression analysis, performed by Bhasin and Jain (2013), on 10 selected Asian countries over the period from 1991 to 2010, show that home country's GDP and openness to FDI have statistically significant impact on the outward FDI. Multiple regression analysis performed by Saad, Noor and Nor (2014) concludes that GDP, number of patents, level of exports, exchange rates, productivity level as well as level of inbound FDI stocks are the key determinants of FDI outflows in Malaysia. Morris and Jain (2015) analysed the relationship between outbound FDI from 34 OECD

countries to 160 destination countries by employing the augmented gravity model. The results of this study show that the size of population, GDP per capita and distance between the source and destination countries explain almost 50% of the variation in outward FDI stock. Other explanatory variables that are found to be statistically significant are colonial linkages, common language, common currency in the two countries as well as abundance of natural resources (Morris & Jain, 2015).

Other source country's macroeconomic variables determining FDI outflows also include openness to trade, human capital, FDI inflows and interest rates (Liu, 2014; Chen, Chin, Law & Azman-Saini, 2016). The final variables that will be used in the models of the empirical study in this paper to control for macroeconomic effects on inward and outward FDI are listed in Table 2.

## 2.5.    The link between monetary policy and FDI

Coskun (2001) in his study on determinants of FDI in Turkey that was performed based on the survey approach argues that such factors as low interest rates and inflation increase the attractiveness of a country to foreign investors. Radulescu, Druica and Omran (2012) investigated the impact of the factors of monetary policy on FDI in Romania in the period from 2000 to 2010. The results of Vector Autoregression analysis reveal statistically significant positive relationship between high interest rates as well as high inflation and inward FDI.

Alawneh, Al-Fawwaz and Shawaqfeh (2015) explore how monetary policy affected FDI in Jordan in the period from 2000 to 2011. Open market operations, obligatory reserve and re-discount rate were chosen as explanatory variables to represent the monetary policy in the econometric model. The authors applied multiple regression analysis and found statistically significant positive relationship between open market operations and FDI, which is explained by the fact that deposits are issued in the local currency what causes the fall in the level of domestic investment and provides more opportunities to FDI. On the contrary, statistically significant negative relationship was found between other two explanatory variables and FDI, which implies that these are two tools that can effectively influence FDI.

The impact of the uncertainty of monetary policy and stability of banking system on FDI inflows in 16 countries of EU over the period from 2001 to 2015 was investigated by

Albulescu and Ionescu (2018). Uncertainty of the monetary policy expressed as the difference between the forecasted and actual interest rates was found to have statistically significant negative impact on inward FDI, while the stability of the banking system proved to have statistically significant positive impact.

Another study that discovered the relationship between the monetary policy tools and FDI was performed by Hasan, AbdulKareem and Daghr (2020). In their research on such relationship in Iraq for the period from 2004 to 2017, the authors conclude the existence of the causality between the growth rate of money in circulation, open market operations, and re-discount rate and FDI in Iraq, however, it is not statistically significant. The significant negative relationship was found between the legal reserve and FDI.

All in all, the number of the studies exploring the link between the monetary policy and FDI is not extensive. Moreover, given the novelty of the measure of the quality of money, its impact is not considered. Nevertheless, the studies discussed above prove the causal relationship between the monetary policy and FDI and provide grounds to believe for the existence of the relationship between the quality of money and FDI. The purpose of this thesis is to fill the gap that exists in this field of research and to investigate whether the quality of money affects the flows of FDI.

The summary of the analysed studies and their conclusions is provided in

Table *1* below.

**Table 1. Summary of empirical studies on determinants of inward and outward FDI**

| Study | Countries | Time span | Methodology | FDI proxy | Conclusions |
|---|---|---|---|---|---|
| **Studies on determinants of inward FDI** | | | | | |
| Lansbury, Pain, and Smidkova (1996) | FDI flows from 14 OECD countries to Hungary, Czech and Slovak Federal Republics and Poland | 1991 - 1993 | Panel regression analysis: Fixed-effects model | FDI inflows | <u>Statistically significant positive impact</u>: research intensity, relative labour costs and privatization schedule. |
| Bevan and Estrin (2000) | FDI inflows into CEE countries | 1994 - 1998 | Random effects panel regression | FDI inflows | <u>Statistically significant positive impact</u>: host country's size. <u>Statistically significant negative impact</u>: labour costs and distance between the host and source country. |
| Coskun (2001) | Turkey | 1990s | Survey | FDI inflows | <u>Statistically significant negative impact</u>: interest rates and inflation. |
| Janicki and Wunnava (2004) | A sample of EU members from 2004 | 1997 | Multiple regression analysis | FDI inflows | <u>Statistically significant positive impact</u>: labour costs, openness to trade and market size. |
| Radulescu, Druica and Omran (2012) | Romania | 2000 - 2010 | Vector Autoregression analysis | FDI (net) | <u>Statistically significant positive relationship</u> between high interest rates as well as high inflation and inward FDI was found. |
| Alawneh, Al-Fawwaz and Shawaqfeh (2015) | Jordan | 2000 - 2011 | Multiple regression analysis | FDI (net) | <u>Statistically significant positive impact:</u> open market operations. <u>Statistically significant negative impact:</u> re-discount rate and obligatory reserve. |
| Chanegriha, Stewart and Tsoukis (2017) | 168 worldwide countries | 1970 - 2006 | Extreme Bounds analysis | FDI inflows (% of GDP) | <u>Statistically significant positive impact</u>: school enrollment into secondary and tertiary levels, trade openness, CIT rate, government spending and outgoing FDI. <u>Statistically significant negative impact</u>: inflation. |
| Albulescu and Ionescu (2018) | 16 EU countries | 2001 - 2015 | Cointegration technique for heterogeneous panels | FDI inflows | <u>Statistically significant positive impact</u>: stability of the banking system. |

| | | | and the FMOLS and DOLS estimators | | Statistically significant negative impact: uncertainty of the monetary policy. |
|---|---|---|---|---|---|
| Hintošová, Bruothová, Kubíková and Ručinský (2020) | Poland, Hungary, Czech Republic and Slovak Republic | 1989 - 2016 | OLS and fixed-effects regression analysis | FDI inflows | Statistically significant positive impact: the level of gross wages and proportion of educated labour force. Statistically significant negative impact: R&D expenditure, trade openness and CIT rate. |
| Ashurov, Othman, Rosman and Haron (2020) | 5 Central Asian countries | 2000 - 2017 | Panel quantile regression | Inward FDI stock | Statistically significant positive impact: trade openness, available labour force, total tax rate, GDP and FDI of the previous year. |
| **Studies on determinants of outward FDI** | | | | | |
| Das (2013) | Developing countries | 1996 - 2010 | Panel regression analysis | FDI outflows normalised by GDP of economy $i$ at time $t$ | Statistically significant positive impact: level of the economic development, trade openness, R7D expenditure. Statistically significant negative impact: political risk, REER. |
| Bhasin and Jain (2013) | 10 selected Asian countries | 1991 - 2010 | Panel regression analysis | FDI outflows | Statistically significant positive impact: home country's GDP and openness to FDI. |
| Saad, Noor and Nor (2014) | Malaysia | 1981 - 2011 | Multiple regression analysis | Outward FDI stock | Statistically significant positive impact: GDP, number of patents, level of exports, the level of inbound FDI stocks. Statistically significant negative impact: exchange rates, productivity level. |
| Chen, Chin, Law and Azman-Saini (2016) | Malaysia | 1980 - 2012 | ARDL model | Outward FDI stock | The empirical evidence reveals that GDP, exchange rate, openness to trade, and corporate tax rate are the key drivers of outward FDI from Malaysia. |
| Cieślik and Tran (2019) | 38 developing countries (investors) and 134 host countries | 2001 - 2012 | Knowledge-Capital model using the Poisson-Pseudo Maximum Likelihood estimation technique | FDI outflows and stocks | Statistically significant positive impact: size and similarity of the market, abundance of skilled-labour and common language. Statistically significant negative impact: distance between the home and host countries, cost of investment and cost of trade. |

# 3.  RESEARCH METHODOLOGY

This chapter of the thesis is aimed at presenting and describing the methodology of the empirical research applied for the analysis of the impact of the quality of money on FDI in Euro area, Japan and USA. As described under the chapter of the literature review, the fluctuations in the volume of FDI flows have been volatile over the past 20 years, reaching both the highest and lowest points in history. There is a number of factors that may have an influence on these flows and various economists explain the volatility from different points of view. This thesis aims to analyse whether the quality of money may also be one of these factors, i.e. affecting the flows of FDI in Euro area, Japan and USA.

Based on the existing literature on the quality of money, decreasing quality of money leads to a decreasing demand for money and increasing demand for non-monetary actives, including financial assets (Žukauskas, 2021). The underlying meaning of FDI is also the purchase of investment into the financial assets (mostly equities) of the company established in a foreign jurisdiction (or establishing the company abroad which also results in holding of financial assets). Therefore, based on the above, the decreasing quality of money should result in increased volume of outward FDI.

Moreover, financial assets are often regarded as a substitute for money when it comes to its function as a store of value. Therefore, if the lower quality of money results in a decrease of the demand for money in its function as a store of value, the demand for financial assets should grow more as compared to the other non-monetary goods (that do not possess the function of storing the value).

The above conclusions provide grounds to assume for the existence of the causal relationship between the quality of money and outward FDI, and the studies on the impact of the monetary policy on inward FDI imply for the assumption on the impact of the quality of money on inward FDI. However, such relationship has not been empirically tested yet, thus this thesis aims to fill in this gap in the research.

This chapter of the thesis is further divided into several parts and begins from the description of the composite indicator used as a measure for the quality of money. It is followed by the identification of other control variables that will be included in the empirical model of this thesis. Further, a description of the methodology to be applied in

in the empirical study is provided. Lastly, the empirical model as well as hypotheses to be tested in this thesis are developed.

## 3.1. Methodology of creation of multidimensional indicator

For a long time, the concept of the quality of money has been considered as a subjective term, which is difficult to measure. As a result, the measure was not developed until the recent work of Žukauskas (2021). Žukauskas (2021) mentions that some of the economists like Bagus and Schiml (2010), Bagus and Howden (2016) have attempted "to quantify some aspects of the quality of money", however, the final measure was not developed. Therefore, in response to the lack of such measure, he created a composite indicator measuring the quality of money in Euro area.

The *multicriteria composite indicator* is composed of a number of components all having impact on the phenomena to be measured by this composite indicator. It allows to measure the value in full rather than explaining it from different points of view (Greco, Ishizaka, Tasiou, & Torrisi, 2019). It also helps to summarize complex issues and analyze them effectively, is easier to interpret than a collection of a number of separate indicators, and also provides for more information than one single indicator. On the other side, it should be constructed, used and interpreted properly. Some of the main disadvantages of composite indicators are related to their misuse and misinterpretation as well as poor construction, which may lead to poor policy decisions and wrong conclusions (OECD, 2008). Therefore, construction of composite indicator requires thorough analysis of the phenomena of interest, i.e. phenomena to be measured by this composite indicator.

The literature review, discussed in the previous chapter of this thesis, revealed that there are different dimensions of the quality of money. Therefore, for the purpose of easier interpretation and effective analysis, composite indicator for the measure of the quality of money should be created. The process of creation involves a number of steps and specific procedures that need to be completed (OECD, 2008; Greco et al., 2019). The main steps are the following:

**1. Review of theoretical framework.** As a starting point, in order to create a composite indicator, a thorough review of theoretical framework should be performed. The theory should clearly define the phenomenon of interest and provide grounds for selection of variables and evaluation of their importance and weight for the indicator to be measured.

It should be noted, however, that the review of theoretical framework should not be based purely on the indicators that are publicly available but should be aimed at the discovery of those that would represent the phenomenon to be measured in the most accurate way. In the cases when composite indicators are constructed in areas where research is not yet extensive, they might include a lot of subjective judgments, therefore, the construction process must be transparent. This is ensured by the following steps in the first phase of construction: first of all, clear definition of the phenomenon to be measured should be provided; secondly, multi-dimensional concepts can be broken down into sub-categories that are inter-related with each other; and finally, selection criteria for variables to be included in composite indicator should be discussed (OECD, 2008).

**2. Selection of variables.** This step allows to identify quantifiable sub-indicators that collectively impact the main indicator of interest. The selection of variables should be justified by the analysis of their relevance for the indicator as well as their weaknesses and strengths should be discussed. In other words, the author developing a composite indicator should be able to defend the chosen measures using the existing theories and empirical studies on the topic of interest. This step is one of the most important ones in the construction of composite indicator since the quality of the chosen variables has a large impact on the accuracy and the quality of the indicator itself. In cases when data is not available, proxies can be used (OECD, 2008). It should also be noted that notwithstanding the fact that the process of selection is grounded by theory and empirical evidence, the subjective judgement of the author is not completely eliminated, therefore, a new composite indicator requires a number of testing before it becomes generally accepted and credible (Žukauskas, 2021).

**3. Imputation of missing data.** This step is applied when there is missing data in the dataset compiled for the construction of composite indicator. The problem of missing data can be dealt with by (i) deletion of cases, i.e. missing entries are omitted from the analysis, (ii) single or (iii) multiple imputation. Although the easiest but the first approach has one major weakness – systematic differences between incomplete and complete samples are ignored. As a result, the probability of the estimates being biased is higher. Moreover, since the sample is reduced, standard errors are usually higher. As a general rule, variables where missing values constitute more than 5% are not omitted. In the second and the third approaches, cases are not being omitted and missing data is treated as part of the analysis.

Single and multiple imputation approaches try to impute missing values using various techniques (e.g. mean substitution, Markov Chain Monte Carlo algorithm and other) (OECD, 2008). Imputation approaches reduce the risk of the estimates being biased, however, they do not always reflect the true situation. Therefore, a thorough analysis of imputed records should be performed before they are used in the analysis of the causal relationship of interest.

**4. Multivariate analysis.** This step is needed in order to identify whether there are any interrelationships between the chosen variables that may lead to confusing and misleading results. The analysis should be performed and variables showing high correlation are recommended to be transformed or eliminated. The conclusion here is that a greater number of variables does not always lead to better and more accurate results. There are several multivariate analysis techniques – principal components analysis (PCA), factor analysis (FA) and cluster analysis (OECD, 2008).

**5. Normalization of data.** The next step in creation of composite indicator is normalization of variables. This step transforms raw data collected from different sources and in different scales into one comparable scale. There is a number of techniques to be performed in order to normalize the data, e.g. ranking, standardization (z-scores), min-max normalization and other. The selection of the technique is also a process requiring separate attention, data properties and the goals of composite indicator should be taken into account. After normalization is performed, robustness tests may be necessary (OECD, 2008).

**6. Assignment of weights to all sub-indicators.** Composite measure is constructed from a number of sub-indicators, each having different importance and relevance for the phenomenon to be measured. Weighting process is performed with the purpose of represent this importance, i.e. each sub-indicator is assigned a specific weight that shows the level of its contribution to the composite indicator. There is a number of techniques that can be used for weighting, e.g. FA, unobserved components analysis (UCM), conjoint analysis (CA), analytic hierarchy processes (AHP) and other. However, irrespective of the chosen technique, assigned weights are generally judgmental estimates. Although weighting can be performed purely using statistical models, some analysts also include their judgements or assign weights based on opinions of other researchers, which in turn may result in biased weighting. Therefore, assignment of

weights based on statistical methods is considered to be more objective and recommended while constructing composite indicator (OECD, 2008).

One of the most common techniques used for weighting is equal weighting (EW). The main principle of this technique is assignment of the same weight for all variables, which in essence means that all variables are equally important for the composite index. The greatest advantages of this technique are the following: it is relatively simple to implement and easy to understand, it is treated as more objective and it can be applied when the underlying theory as well as empirical evidence is not sufficient to justify varying weights (OECD, 2008).

The problem with EW is, however, that by combining highly correlated variables, double counting may appear, i.e. when two highly correlated variables are included each having separate weight of $w_1$ and $w_2$, in essence the common measure of these two variables will contribute to the index with a double weight ($w_1 + w_2$). Therefore, in order to avoid this problem, statistical correlation tests must be performed, and it is recommended to choose the variables with low correlation or perform corresponding adjustments to weights, e.g. assign lower weights to highly correlated variables. Moreover, eliminating excessive variables is usually also recommended for transparency purposes. Nevertheless, it should be noted that some degree of positive correlation will be present in most cases when constructing composite index, thus, some threshold of permissible correlation should be defined (OECD, 2008).

**7. Aggregation of values of sub-indicators into a single composite indicator.** This step combines all variables that went through the previous steps and were finally chosen as suitable to be included into calculation of single indicator. As with normalization and weighting, there is a number of aggregation techniques to be chosen from. In the literature, these are generally distinguished into two categories – non-compensatory and compensatory aggregation methods (e.g. Greco et al., 2019). Compensatory approach is the one when low performing variables are offset with the high performing ones, while during non-compensatory aggregation such trade-off does not occur. The examples of compensatory methods include linear and geometric aggregations. Linear aggregation assumes constant compensability, while compensability of lower values is much lower in case of geometric aggregations. In other words, if geometric method is used for aggregation, a country having low performing variables will need a much better

performance in other ones to compensate them. Therefore, in practice, linear aggregation is more common than geometric (OECD, 2008).

The main problem of compensatory approaches is, however, that weights assigned to the variables lose their function of representing the importance in the composite of that variable. Therefore, if importance of weights is relevant (e.g. when dimensions that are aggregated are highly different), non-compensatory methods should be chosen. The most common non-compensatory method is multi-criteria approach (MCA), however, if there is a great number of countries under analysis, application of MCA might be relatively costly from the computational perspective (OECD, 2008).

As mentioned, linear aggregation is the most commonly used in practice and proven by the number of studies that it is appropriate for creation of economic composite indicators (since compensability is permitted), therefore, this approach will be applied in this thesis as well.

**8. Sensitivity analysis.** It is the last and also very important step in construction of composite indicator. Sensitivity analysis is the analysis of the composite indicator's output's variation that depends on a number of assumptions made in the process of its creation. Since the process of construction involves a number of judgmental and subjective assumptions, this step is crucial to assess how these assumptions and uncertainties affect the final outcomes (OECD, 2008).

All the steps listed above will be applied in this master thesis for the construction of the composite indicator measuring the quality of money. Such measure will allow to test the impact of the quality of money on the FDI flows in Euro area, Japan and USA, which is the main goal of this thesis.

## 3.2. Components of multidimensional indicator measuring the quality of money

For the purpose of measuring the quality of money in Euro area, Japan and USA in the scope of this master thesis, I intend to use the methodology developed and proposed by Žukauskas (2021). The index proposed by Žukauskas (2021) consists of 6 sub-indicators – central banks' balance sheet, money supply, interest rates, financial system stability, forward guidance and price inflation – with a number of variables under each of them.

**Central banks' balance sheet.** This sub-indicator was initially suggested by Bagus and Howden (2016) who argue that assets of the central bank act as a collateral for the monetary base, i.e. possession of these assets proves the central bank's capability to safeguard the value of the currency on both local and international level. This dimension is assessed by several liquidity ratios: (a) gold, (b) reserve assets (including gold), (c) government debt and reserve assets (including gold) to monetary base; a couple of ratios representing international strength – foreign reserves in terms of monetary base and in terms of foreign reserves of the whole world (in total) and an equity ratio of capital to total assets.

**Money supply.** Another factor affecting the quality of money is the supply of money. Although the amount of money in circulation at one point of time does not affect the ability of money to act as a medium of exchange, heavy manipulation of the supply of money resulting in frequent fluctuations over the long run influences the stability of the money's purchasing power. This sub-indicator consists of the following variables represented in terms of their growth: monetary aggregates (M1 and M3), total assets of the central bank and monetary base (Žukauskas, 2021).

**Interest rates.** Interest rate is one of the instruments used by the central banks to reach the goals set in their monetary policies. Central banks introduce target interest rates that are expected to drive the monetary policy towards desired outcomes in the economy. A number of empirical studies have proved the negative correlation between the interest rates and the supply of money, i.e. when the supply of money is increased, the interest rates decrease and consequently, the purchasing power of money decreases in the long run as well, which leads to poorer quality of money. Five sub-indicators were chosen to represent the sub-indicator of the interest rates in the measurement of the quality of money by Žukauskas (2021): interest rates set by ECB on marginal lending facility, key refinancing operations and deposit facility; spread between the interest rate on key refinancing operations and interest rate established according to the Taylor's rule[4]; and spread between the natural interest rate and interest rate on key refinancing operations (Žukauskas, 2021). However, due to the differences of the tools used in application of the

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[4] Taylor's rule suggests the way for central banks to manipulate interest rates as a response to changing situation in the economy (prices and output variations in order to the targets) with the aim to stabilize it after the short-term shocks, but also maintain the growth in the long run (Taylor, 1993).

monetary policies by ECB, Bank of Japan (BOJ) and Federal Reserve System (FED) and limited availability of some of the variables, the sub-indicator of interest rates will be measured in the empirical study of this thesis by the two interest rates that are similarly applied in all of the regions under research, i.e. interest on overnight borrowing from the central bank and on overnight deposits.

**Financial system stability.** According to Žukauskas (2021), financial system stability has also an influence on the quality of money in a way that unstable system which is lacking liquidity may result in bailouts that could in turn increase the quantity of money. This sub-indicator representing the stability of financial system is assessed by Euribor – overnight index swap (OIS) spread and Composite Indicator of Systemic Stress (CISS) in the original measure of the quality of money. The public availability of the data on OIS is, however, limited. Therefore, for the purpose of the empirical study performed in the scope of this master thesis, financial system stability will be assessed by the CISS in Euro area and USA, and Financial Stress Index developed by Japan Center for Economic Research (JCER) in Japan.

CISS is composed of 5 market-related sub-indicators, i.e. equity market, money market, foreign exchange market, bond market and the sector of financial intermediaries, that in turn are assessed by 15 individual variables representing financial stress in the financial system. The indicator represents the level of the financial stress in the financial system (Holló, Kremer & Duca, 2012). Originally, the measure was developed for Euro area only, but later the indicator was calculated and published for broader list of countries, including USA. JCER Financial Stress Index was calculated applying exactly the same methodology as for calculation of CISS (Samikawa & Miyazaki, 2020).

**Forward guidance.** This sub-indicator represents the communication of the central bank about anticipated events, changes to be introduced into policies and interest rates. It is one of the main instruments used to form the expectations of firms and individuals about the coming changes influencing monetary policy. As an example, if market participants would expect the long-term inflationary state of financial system, they would also expect low interest rates and increasing supply of money. Forward guidance is measured by the spread between the rate on key refinancing operations and OIS rate lagged by two years in the original indicator of quality of money (Žukauskas, 2021). Due to lack of publicly

available information, it is not included into the calculation of the indicator for the purpose of this thesis.

**Price inflation.** The level of price inflation is another dimension of the composite indicator of the quality of money. It presents the ability of money to maintain its purchasing power. Based on the theorem of Mises (1912, 2012), current demand for money and its subjective value comes from the past prices of all non-monetary goods (Žukauskas, 2021). This sub-indicator is measured by annual price inflation in current terms based on the Harmonized Index of Consumer Prices (HICP) in Euro area and based on the Consumer Price Index (CPI) in USA and Japan.

## 3.3.    Recent trends in FDI flows by region

Global trends in FDI flows have been discussed in the previous chapter of this thesis. However, since the aim of the thesis is to not only test the overall impact of the quality of money in three regions, but also perform an empirical research on each of them. Therefore, the analysis of the trends in each of the regions under research is relevant and is presented in this section.

**Euro area.** The same trends as discussed previously under the analysis of global trends are observed in the Euro area, i.e. FDI flows are plummeting (Figure 2). However, there is more volatility among the separate Euro area countries. For example, inflows to the Netherlands shrunk by 98% in 2019 (caused by the large divestment), while increased to Ireland by from negative USD 28 billion in 2018 to positive USD 37 billion in 2019, which was mainly caused by the acquisition of Shire PLS by the Japanese company Takeda Pharmaceutical Co Ltd (UNCTAD, 2020).

Based on the estimated data for 2020 (which is available for EU), FDI inflows to EU27 decreased by 71%, where 17 countries recorded decline. Although the number of cross-border mergers and acquisitions (M&A) increased in Germany, the country recorded the fall of FDI inflows by more than 50%. Italy and Austria are also among the countries that experienced large divestments, such huge market players as Vodafone in Italy (FDI from United Kingdom (UK)) and Mubadala Investment Co PJSC in Austria (FDI from United Arab Emirates (UAE)) have sold their stocks to local companies (UNCTAD, 2021).
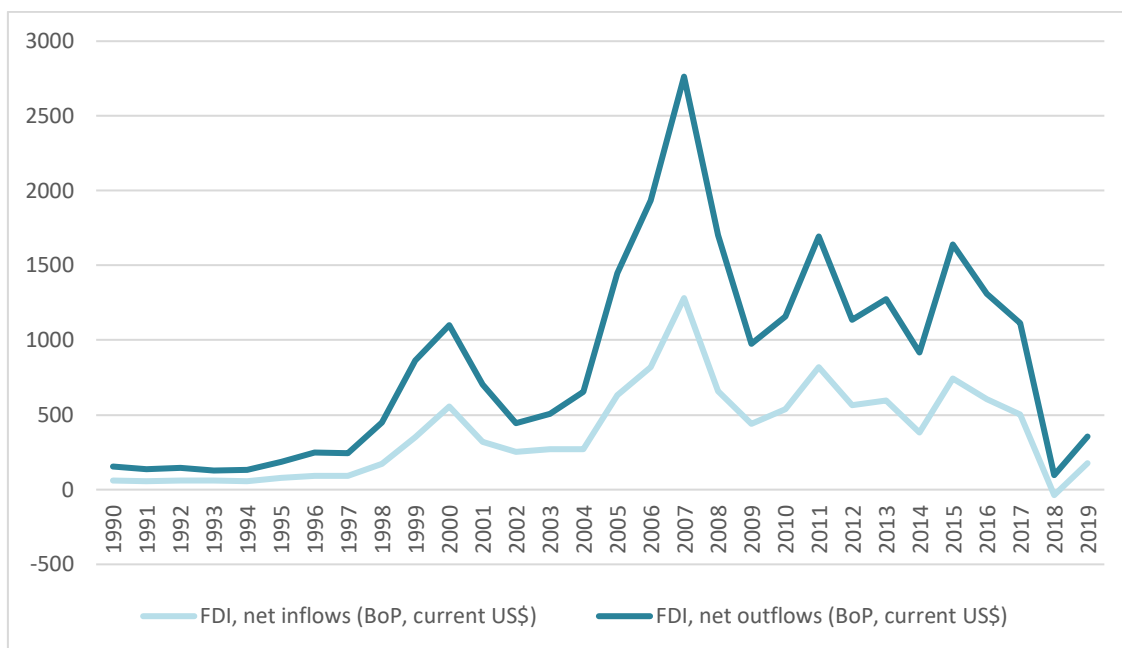
*Figure 2.* **Net flows of FDI in Euro area from 1990 to 2019 (in billions)**
*Source*: graph created by the author. Data from World Bank Database.

On the other side, there were also a number of countries where the increase of FDI flows have been observed. For example, FDI inflows rose by more than 50% in 2020 in Spain due to a number of completed cross-border acquisitions (UNCTAD, 2021).

**Japan.** Over the past few years, Japan has been among the leading countries in the volumes of outward FDI and in 2019, for the second consecutive year, it became the largest investor in the world. As in Euro area, the volume of the flows has been volatile over time, however, increasing trend can be observed from 1993 (Figure 3 below). The highest peak of outward FDI has been reached in 2019, which is largely due to the significant increase in M&As (from USD 36 billion in 2018 to USD 104 billion in 2019), more than half of which constitutes the value of the deal between Takeda Pharmaceutical Co Ltd and Shire PLS (in Ireland). This transaction together with several other more than doubled Japanese outward FDI into Europe. The key sectors into which Japan has increased its investments are wholesale and retail as well as pharmaceuticals in Europe and electric machinery and communication in North America (UNCTAD, 2020).

On the contrary, Japanese inward FDI remains relatively low, but at the same time volatile as compared to other developed countries. The low levels of inward FDI have been mainly caused by the restrictive policies and regulations in force aimed at protection of local

companies. Nevertheless, 48% increase of FDI inflows was recorded in 2019 by the country which was mainly due to the increased investment flows from USA (JETRO, 2020). Moreover, the volumes of the inward FDI into Japan are expected to rise in the future and the country is implementing various measures and reviewing existing policies with an aim to reduce the barriers for inflows, however, the rise is not expected to be significant (Manger, 2020).



*Figure 3.* **Net flows of FDI in Japan from 1990 to 2019 (in billions)**
*Source*: graph created by the author. Data from World Bank Database.

**USA.** USA is in the second place by the volume of outward FDI worldwide. The trends of FDI flows in USA, however, have been the most volatile as compared to other two regions under analysis (Figure 4). As mentioned, the sharpest drops of outward FDI were recorded in 2005 and 2018 due to the decisions implemented by the government that encouraged repatriation of foreign funds.

USA, as a separate country, is the largest recipient of FDI worldwide due to its large market, huge number of consumers, developed infrastructure, productive workforce, innovation prone business environment and transparent judicial system. The sectors attracting the most investments are trade and maintenance, insurance, financial activities and manufacturing. Although there was a slight decrease of inward FDI in USA in the period from 2015 to 2018, the volume started rising again in 2019, mainly due to increased investments from Australia and Japan. In 2020, however, due to the outbreak

of COVID-19, USA recorded a drop of 49% in inward FDI. The performance was still better than of the majority of other developed countries, where the inward FDI decreased by 69% on average in 2020 (UNCTAD, 2021).
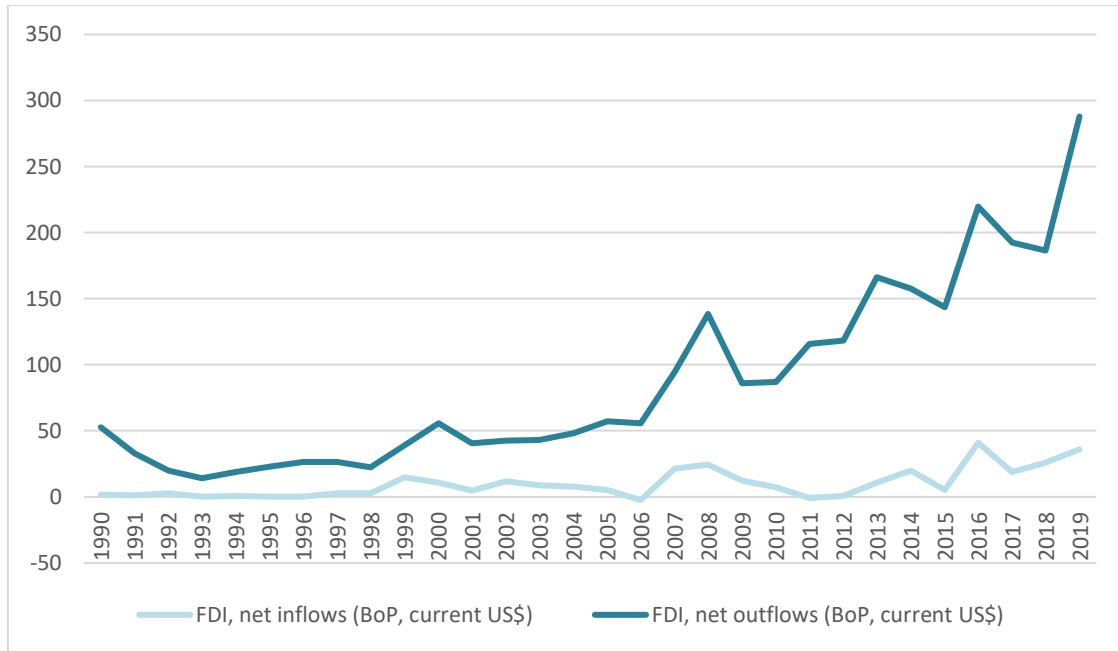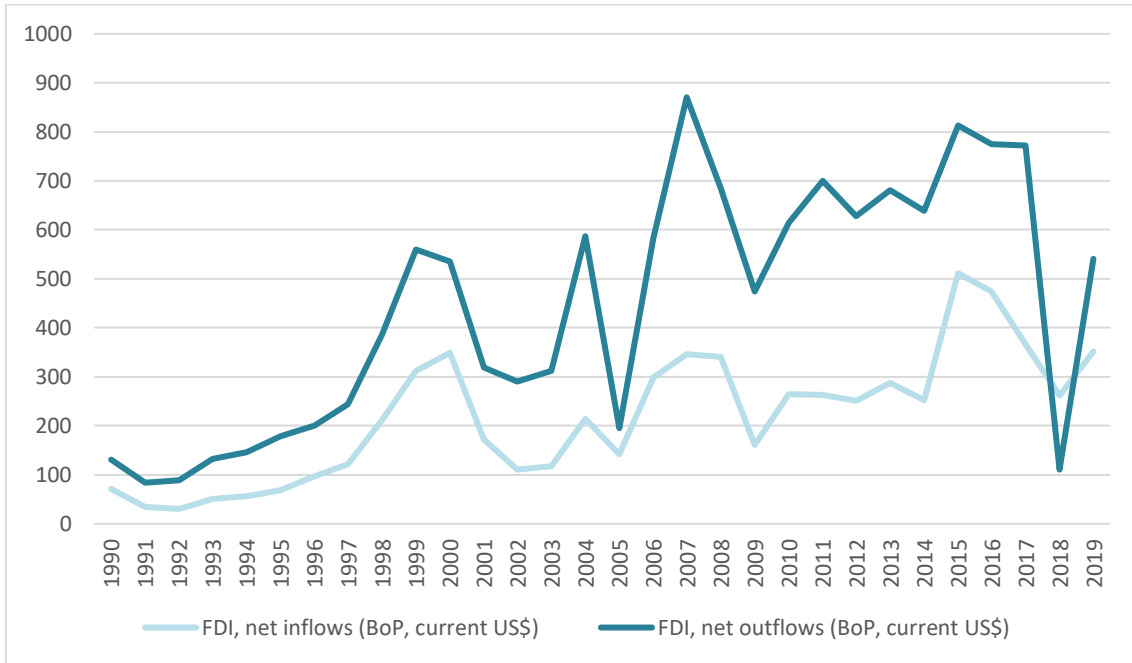


*Figure 4.* **Net flows of FDI in USA from 1990 to 2019 (in billions)**
*Source*: graph created by the author. Data from World Bank Database.

## 3.4. Research methodology applied for the assessment of the impact of the quality of money on FDI

Empirical study of this paper aims to explore the impact of the quality of money on both inward and outward FDI in Euro area, Japan and USA. In other words, the impact is analysed from the two perspectives: i) whether the quality of money is one of the factors contributing to the attractiveness of countries in Euro area, Japan and USA as destinations of FDI, and ii) whether the quality of money contributes to the decisions of investors related to outward FDI in Euro area, Japan and USA.

Majority of empirical studies discussed in the previous sections of this paper have performed panel regression analyses for the purposes of their research. Starting from the simple regression models in the first studies, upgrading to the more advanced models nowadays. Panel data contains the observations of selected variables in a number of units over a specified period of time. Panel regression analysis allows to perform a wider scope research which enables not only to look at the effects of one variable on another at a single

point of time, but also how the relationship has changed over time, thus, the estimates it provides are considered to be more accurate and the data more informative (Hsiao, 2005).

The common model of a panel data looks as follows:

$$y_{it} = \alpha + \beta' X_{it} + u_{it},$$

$$\text{where } u_{it} = \mu_i + v_{it}$$

$y$ is a dependent variable, $X$ – explanatory (independent) variable, α is an intercept, $\beta$ – a coefficient of explanatory variable, $i$ and $t$ represent the entities and time respectively, $\mu$ is an unobserved heterogeneity or a country-specific effect, and $v$ is an error term.

Panel regression analysis may be performed using a pooled OLS regression model. This technique is used when the data to be analysed is relatively similar (can be pooled into a group of units having similar characteristics). The technique, however, has also its disadvantages. Pooled OLS provides the most efficient estimates when the error terms are homoscedastic, and there is no serial correlation between them (Wooldridge, 2009). Thus, in the presence of heteroscedasticity or non-homogeneity of the data, an estimation output will be biased, and will provide large standard errors. More specifically, the presence of omitted variable bias is possible when using pooled OLS. In such case, another technique shall be taken into consideration.

Alternative model is fixed effects model which is a major tool that helps to eliminate omitted variable bias if the assumption that unobserved effects are constant over time holds. In such case, the model enables to control the unobserved across-country differences and eliminates the constant over time unobserved heterogeneity prior to estimation by removing all the variables that do not vary over time and might be a cause for the correlation between the explanatory variable and unobserved effect. Such variables are removed by employing a first difference. Hence, the most significant advantage of the model in question is its ability to remove the correlation which creates bias in the estimates (Wooldridge, 2009). When analysing the impact of the quality of money on FDI flows in the countries under analysis, the possibility of the presence of the omitted variable bias is high, and the unobserved effect may be present as well, therefore, fixed effects model will help to solve the issue.

The most significant limitation of the model, on the other side, is the inability to assess the impact of explanatory variables that do not vary enough within the country over a

period of time. In this paper, however, there are no time-invariant variables included, thus, a limitation is not applicable and fixed effects model might be employed.

Another model which may be suitable to be employed in the empirical part of this paper is random effects model. In comparison to the fixed effects, random effects model does not eliminate the unobserved effects, instead, they are assumed to be errors that are uncorrelated with variables (Clark & Linzer, 2015). The decision whether to use or not this model is based on the results that Hausman test provides. The null hypothesis of the test states that fixed effects model provides more efficient estimates. The rejection of the null hypothesis, on the other side, implies that more suitable for the estimation is random effects model. The decision which model is more suitable for the purposes of this paper, fixed or random effects, if necessary, will also be based on the results of the Hausman test.

What is more, a problem of heteroscedasticity may be present when analysing the impact of the quality of money on FDI flows. Thus, if such case appears to be an issue in this paper, firstly, weighted least squares (WLS) model will be employed. The model is used when the assumption of homoscedastic error terms is breached, and the goal is to eliminate the problem of heteroscedasticity. On the other side, although WLS helps to eliminate heteroscedasticity issue, it also has its limitations. First of all, the model is very sensitive to outliers. Secondly, the estimated results are not universally applicable for all the units under research, i.e. the relations discovered by WLS can only be applied to the units that have lowest error variance. And lastly, the estimated results may be inefficient, because prior the estimation it is assumed that all of the weights are known which is usually not the case. Therefore, if WLS model does not provide efficient results, other transformation techniques will be applied.

All in all, the technique of the panel data analysis which provides the most efficient results is selected for each situation individually. The decision which model is the most suitable should not be made purely relying on recommendations and previous practice, but on results obtained from the panel diagnostic test, Hausman test or other statistical tests, if necessary. However, it does not include WLS model, thus further comparisons will be performed relying on adjusted $R^2$ (the adjusted for the number of independent variables statistic which illustrates how much variation of the dependent variable is explained by the independent variables, i.e. higher adj. $R^2$ represents the better fit of the model), Akaike

criterion (the statistic showing the relative quality of the model, i.e. model with the lower Akaike criterion is supposed to be better) and the number of significant variables included in the model, if necessary.

Panel regression analysis provides results that are aggregated for all the units under analysis, i.e. if the data for several countries or regions is analysed, panel regression analysis will provide a common coefficient for all of the countries under analysis. In the study of this paper, panel regression analysis will be employed to test the impact of the quality of money on FDI flows for the countries of Euro area (the countries that have been in Euro area since 1999 are included).

One of the objectives of this study is also to test the impact of the quality of money in each of the regions/countries under analysis separately and compare the results. For such purpose, multiple linear regression analysis will be applied. Several assumptions must be met when the multiple regression analysis is performed – residuals should be normally distributed, there should be linear relationship between the dependent and explanatory variables, there should be no multicollinearity (i.e. there should be no statistically significant linear correlation between explanatory variables) and heteroscedasticity problems (Wooldridge, 2009). Empirical study of this master thesis will be performed using GRETL software.

## 3.5.    Description of data employed in empirical part of this thesis

This study aims to explore the impact of the quality of money on FDI flows in three separate regions: Euro area, Japan and USA. As the trend analysis presented in the first part of this thesis revealed, these are the top performing regions in both outward and inward FDI flows. However, statistical data also shows that the volumes have been volatile over the past decades, therefore, the objective of this paper is to identify whether the quality of money has contributed in any way to such fluctuations. It should also be noted that aggregated data has been collected for Euro area. The decision to analyse the whole region instead of separate countries was mainly due to the fact that these countries have the same currency (thus, it makes the construction and interpretation of the composite indicator more accurate) and their financial system is centrally controlled by the ECB, which given the variables included in composite indicator provides for assumption that the quality of money should be similar among all countries of the region.

The period of time under research is from 1999 to 2019, covering 21 years. The selection of time period was mostly based on the availability of data. The most recent statistics were published for the year 2019, while the beginning of the period is the year (1999) when Euro was introduced. Data for Japan and USA is also collected for the same period for the purpose of comparability of estimation results.

Data on variables forming the composite indicator was collected from the official databases of each region's central bank, i.e. for Euro area – from ECB Statistical Data Warehouse, for Japan – from Statistics presented by the BOJ and for USA – data presented by the FED was used. Data on inward and outward FDI flows was derived from UCTAD database, and on macroeconomic indicators – from the World Bank Database: World Development Indicators.

## 3.6.    Empirical model and hypotheses tested in this thesis

Two main empirical models that will be used in this thesis are the following:

$$\Delta \ln IFDI_{it} = \alpha + \beta_1 \Delta \ln QoM_{it} + \beta_2 \Delta \ln QoM_{it-1} + \beta_n \Delta \ln CONTROL_{it-1} + v_i + \sigma_t + \varepsilon_{it},$$

$$\Delta \ln OFDI_{it} = \alpha + \beta_1 \Delta \ln QoM_{it} + \beta_2 \Delta \ln QoM_{it-1} + \beta_n \Delta \ln CONTROL_{it-1} + v_i + \sigma_t + \varepsilon_{it}.$$

The complete list of variables under research is listed in Table 2. All the variables are transformed into a logarithmic form which will allow the interpretation of estimates in percentage.

When performing an empirical study on the impact of the quality of money on FDI flows, it should be taken into account that there is a number of other factors that simultaneously affect dependent variable. These additional factors are called control variables and will be used in this study as well. Literature review revealed that the quality of money should affect outward FDI, since it is related to decisions of market participants whether to hold cash or invest, and inward FDI as the determining factor of the country's attractiveness. The empirical part of this thesis aims to explore the impact of the quality of money on both inward and outward FDI in Euro area, Japan and USA. Consequently, other factors influencing both inflows and outflows of FDI are relevant.

Empirical studies performed to identify these determinants and their conclusions were discussed in the first part of this thesis, therefore, they will not be described in detail here. To summarize that has been previously stated, the following control variables will be used

to test the impact of the quality of money on inward FDI in Euro area, Japan and USA: GDP per capita, trade openness, labour costs, education level of the labour force and tax rate, and on outward FDI: GDP per capita, trade openness, FDI openness, R&D investment and REER index. The full list of variables that will be used in the models of the empirical study in this paper to control for macroeconomic effects on both inward and outward FDI are listed in Table 2.

In total, six regressions will be run in empirical study of this thesis to test the impact of the quality of money on both outward and inward FDI in the countries under research, i.e. the six regressions are aimed to test whether:

1. there is a positive impact of the quality of money on inward FDI in Euro area;
2. there is a relationship between the quality of money and outward FDI in Euro area;
3. there is a positive impact of the quality of money on inward FDI in Japan;
4. there is a relationship between the quality of money and outward FDI in Japan;
5. there is a positive impact of the quality of money on inward FDI in USA;
6. there is a relationship between the quality of money and outward FDI in USA.

Finally, as a result of the literature review performed in the previous part of this paper, the following hypotheses to be tested in this study were established:

H01: The quality of money in Euro area, Japan and USA has decreased over the period under research given the increasing demand for financial assets;

H02: There is a statistically significant negative relationship between the quality of money and outward FDI in Euro area, Japan and USA;

H03.1: There is a statistically significant positive relationship between the quality of money and inward FDI in Euro area;

H03.2: There is a statistically significant positive relationship between the quality of money and inward FDI in Japan;

H03.3: There is a statistically significant positive relationship between the quality of money and inward FDI in USA.

**Table 2. List of variables used for the purpose of testing the empirical relationship between the quality of money and FDI**

| Variable type | Variable | Definition | Explanation | Expected sign |
|---|---|---|---|---|
| **Dependent_1** | $\Delta\ln IFDI$ | Inward FDI stock (% of GDP) | Inward FDI stock (% of GDP) represents the level of inward FDI in a country of interest. | n/a |
| **Dependent_2** | $\Delta\ln OFDI$ | Outward FDI stock (% of GDP) | Inward FDI stock (% of GDP) represents the level of inward FDI in a country of interest. | n/a |
| **Independent** | $\Delta\ln QoM$ | Composite indicator for the quality of money | The quality of money is also the proxy for monetary policy. Better quality of money implies for a more stable and stronger monetary policy, therefore, based on the previous empirical studies, it should attract inward FDI.<br><br>Better quality of money also means its use as a mean of exchange rather than store of value, thus it would lead to lower long-term investments, including outward FDI. | Positive for IFDI<br><br>Negative for OFDI |
| **Control_1** | $\Delta\ln LCOST$ | Labour cost (total compensation/GDP, both in current local currency) | The lower the labour costs, the more attractive the country seems to investors. | Negative |
| **Control_1** | $\Delta\ln LPROD$ | Labour productivity (GDP constant 2010 US$/working age population [population size*% of working age population] | The more productive the labour force is, the more attractive the country seems to investors. | Positive |
| **Control_1** | $\Delta\ln TAX$ | Taxes (% of GDP) | High tax burden in destination country discourages foreign investors from coming. | Negative |

| Control_1 & Control_2 | ΔlnGDPpc | GDP per capita (constant 2010 US$) | High GDP per capita is an indication of greater purchasing power and thus higher domestic demand in the country. In terms of the inward FDI, higher GDP per capita is better, because it implies for a bigger market which is the factor that attracts FDI. In the case of outward FDI, on the other side, sufficient domestic market would discourage FDI outflows. | Positive for IFDI<br><br>Negative for OFDI |
|---|---|---|---|---|
| Control_1 & Control_2 | ΔlnTOPEN | Trade openness (trade as a % of GDP) | Openness to trade provides information on foreign markets to investors which should positively affect both inward and outward FDI. | Positive |
| Control_2 | ΔlnFDIOP | Openness to FDI (source country's FDI stock/its GDP in constant 2010 US$) | The more liberal capital movement policy a country has, the more it encourages local companies to international expansion which results in greater outward FDI. | Positive |
| Control_2 | ΔlnREER | REER index | Exchange rate appreciation results in cheaper overseas investments and decreasing attractiveness of exports thus leading to greater outward FDI. | Positive |
| Control_2 | ΔlnRDINV | R&D expenditure (% of GDP) | This is the proxy for measurement of innovation efforts in the country (Das, 2013). The more the country is prone to innovations and investment into science and technology, the greater is the probability of it to engage in outward FDI. | Positive |

# 4. RESEARCH RESULTS AND DISCUSSION

This chapter of the thesis presents the results of the empirical study performed as well as their interpretation. First of all, the calculation of the composite indicator measuring the quality of money is presented, it is followed by the brief discussion of the trends of the quality of money and finally, the results of the testing on the impact of the quality of money on FDI are discussed.

## 4.1. Assessment and results of multidimensional indicator of the quality of money

As mentioned in the previous chapter of this paper, the process of creation of the composite indicator involves several steps and specific procedures that need to be completed (OECD, 2008; Greco et al., 2019), i.e. review of the theoretical framework, selection of variables, correlation check, normalization, weighting, aggregation and sensitivity analysis. Theoretical framework was reviewed and the logic behind the choice of variables was explained in the previous sections of this paper. Further steps in creation of composite indicator are explained in this section.

**Correlation check**. After variables have been chosen, correlation analysis was performed. The results of the analysis are presented in correlation matrix (Annex 2). Positive high correlation (based on the Pearson correlation coefficient, when the value of the coefficient is higher than 0.7) was found between some of the variables, however, these variables are aggregated into one single sub-indicator (dimension), therefore, for the purpose of calculation of composite indicator they are treated as one variable and their weights will be decreased accordingly so that the total weight corresponds to the weight of other separate variables (more detailed explanation is provided in the paragraph about weighting further in the paper).

**Normalization.** The method chosen for the normalization of variables of the composite indicator was min-max transformation. Such transformation changes the values of variables into a scale from 0 to 100, where 0 is assigned to the lowest value of the variable, and 100 – to highest. The method is appropriate for this study since: (1) the values of the variables chosen for the calculation of the composite indicator do not have extreme values and high variability, (2) the importance of the changes of the value of variable does not

change depending on its level, i.e. the change itself and its direction is more important than its level, and (3) such transformation is easier in interpretation and understanding.

Transformation was performed using the following formulas:

$X'^t_a = \frac{x^t_a - \min{(x_a)}}{\max(x_a) - \min{(x_a)}} * 100$, where higher values of the variable increase the value of the composite indicator and

$X'^t_a = \frac{\max(x_a) - x^t_a}{\max(x_a) - \min{(x_a)}} * 100$, where lower values of the variable increase the value of the composite indicator;

where:

$X'^t_a$ — the value of normalized variable $a$ at time $t$;

$x^t_a$ — the data point of variable $a$ at time $t$;

$\min(x_a)$ — the lowest data point of variable $a$;

$\max(x_a)$ — the highest data point of variable $a$.

**Assignment of weights.** The weights for variables and sub-indicators were assigned separately in two steps. First of all, the weights were assigned to the sub-indicators (dimensions) of the composite indicator by applying the regression analysis. Then the weights of individual variables were decided based on the correlation analysis and the weights of dimensions.

*Assignment of weights to sub-indicators (dimensions).* The composite indicator that is being created in this study is composed of five sub-indicators (dimensions), that in turn are composed of several individual variables. The weights to the specific sub-indicators were assigned based on the results of regression analysis – each sub-indicator was regressed against the composite indicator. For this purpose, at first, the composite indicator was created using equal weights. Separate regressions for each sub-indicator were run and coefficient of determination ($R^2$) was the deciding factor whether the resulting coefficient of the explanatory variable, the coefficient of sub-indicator in this case, is appropriate or not. The aim was for the $R^2$ of each sub-indicator to be as similar as possible so that the level of variance in the composite indicator (dependent variable) is explained more or less equally by each sub-indicator (explanatory variable). After the regressions with equal weights were run, the weights were adjusted based on the results

of $R^2$, i.e. the weights of sub-indicators with high $R^2$ were decreased and the weights of sub-indicators with low $R^2$ were increased. Such procedure was repeated until the minimum possible standard deviation among $R^2$ of the regressions for all sub-indicators was achieved. The final weights assigned to sub-indicators are provided in Table 3 below, while the full procedure is disclosed in Annex 3. The $R^2$ are not completely equal, but they are at the more similar level as compared to the case of equal weights.

**Table 3. Final weights of sub-indicators of the composite indicator of the quality of money**

| Sub-indicator | R2 (equal weights) | R2 after adjustment | Final weights |
|---|---|---|---|
| **Balance Sheet** | 42% | 23% | 13% |
| **Money supply** | 22% | 20% | 20% |
| **Interest rate** | 28% | 18% | 20% |
| **Financial stability** | 20% | 20% | 20% |
| **Inflation** | 5% | 19% | 27% |

It should also be noted that several rules were imposed for such weighting, namely, the minimum and maximum weights were set before the weighting procedure. The weight of 5% was set as the minimum weight. This is to ensure that all components of the composite indicator that were chosen based on the review of literature contribute to the final indicator at least at minimum level. The maximum weight was set at 35% to avoid the situation of one sub-indicator overwhelming the other ones in the final composite indicator which would create a biased measure of the quality of money.

*Assignment of weights to individual variables under sub-indicators.* The weights assigned to individual variables correspond to the ones assigned to sub-indicators during the first step, i.e. the weight of the sub-indicator was divided by the number of individual variables forming this sub-indicator. However, some variables form several different groups inside sub-indicator. For example, sub-indicator of the Balance sheet is composed of different variables representing liquidity, external strength and equity level in the central bank's balance sheet. Therefore, the weight of the whole sub-indicator was divided into three topics and then 1/3 of the whole weight was divided by the number of individual variables related to that topic. This also helped to overcome the problem of the correlation since the weights of variables where correlation was spotted were decreased and their final

contribution to the composite indicator was as of one single variable. The detailed list of all weights assigned to sub-indicators and variables is provided in Annex 4.

**Aggregation.** The method chosen for aggregation of the composite indicator of the quality of money was linear aggregation. This is the compensatory aggregation method, i.e. application of such method implies that the poor performance of one sub-indicator is compensated by the better performance of another. Based on the review of the literature on the quality of money, it can be stated that compensation between the sub-indicators of the composite indicator of the quality of money is possible. Moreover, such aggregation method is the most used in the literature of creation of composite indicators. Therefore, the final value of the composite indicator measuring the quality of money is the arithmetic mean of all the variables with the weights assigned to them. The alternative approach for aggregation would be geometrical aggregation. However, since after normalization some values of the variables were transformed into zeros, geometric aggregation would not be work in this case.

**Sensitivity analysis.** Sensitivity analysis tests the assumptions made during the creation of the composite indicator and their impact on the final results. During the creation of the composite indicator measuring the quality of money the following main assumptions were main:

     a)   Related to the choice of variables and sub-indicators;

     b)   Related to the choice of normalization method;

     c)   Related to the assignment of weights to variables and sub-indicators;

     d)   Related to the choice of aggregation method.

The measure for the quality of money has been composed from the maximum variables and sub-indicators that were discovered during the review of the literature and for which data was available. It should be noted that there is a limited number of variables for which data was publicly available that could measure identified sub-indicators and all these variables were included into calculation. The impact of the choice of variables and sub-indicators will be also partially tested during the sensitivity analysis on weighting. The chosen method for normalization of variables (min-max transformation) corresponds to the purpose of the composite indicator and data type used for calculations. Therefore, sensitivity analysis will be limited to testing assumptions of weighting and aggregation.

For the purpose of sensitivity analysis, the most common alternatives of weighting (assignment of equal weights) and aggregation (geometric average) are compared to the chosen ones. The following four calculation techniques will be compared: 1) arithmetic mean with adjusted weights (main one), 2) geometric mean with adjusted weights, 3) arithmetic mean with equal weights and 4) geometric mean with equal weights. The results of the four indicators are provided in Figure 5 below.
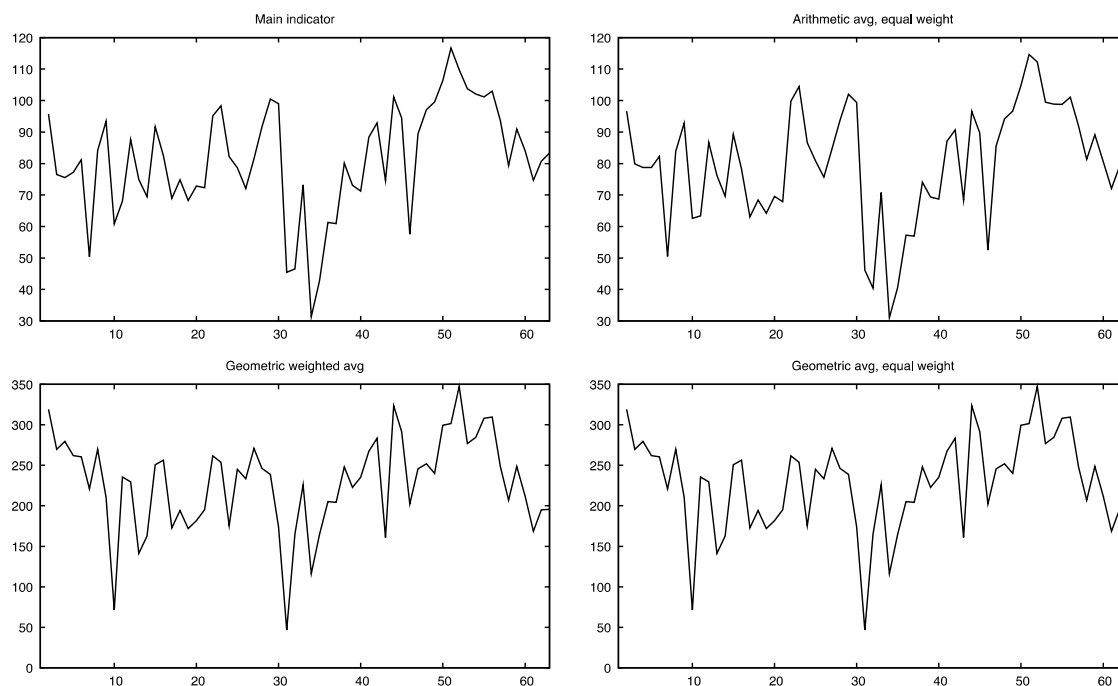


*Figure 5. Results of sensitivity analysis of the composite indicator of the quality of money*
*Note. Calculated using statistical program – Gretl*

It can be seen from the graph that in general the trend and direction of all indicators are very similar. In both cases, either it is arithmetic or geometric average, weighting method does not have any significant influence on the final value of composite indicator. The difference is observed between the aggregation methods applied, and it can be seen mainly in the level of the calculated measure. Such difference, however, should not result in any adverse consequences for the results of empirical study to be performed due to the fact that for the purpose of testing the impact of the quality of money its change rather than the level is more relevant. Based on the above, it can be concluded that assumptions related to weighting and aggregation methods are adequate.

*Average level of the quality of money.* Figure 6 below presents the overall results of the composite indicator of the quality of money in Euro area, Japan and USA (as the mean for these regions). In general, the average quality of money has not changed significantly from 1999, it dropped from 51.77 points in 1999 to 50.88 points (both in the scale from 0 to 100) in 2019. However, during this period there were quite significant fluctuations. The highest point was reached in 2000 (61.53 points), while the lowest point – in 2008 (32.71 points).
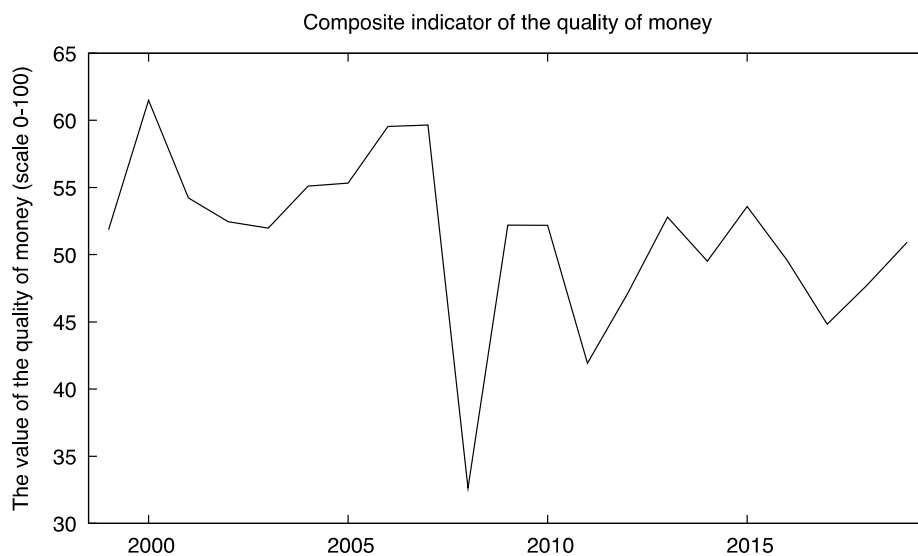


*Figure 6.* **Composite indicator of the quality of money (mean for three regions; scale: 0-100)**
*Note. Calculated using statistical program – Gretl*

The increase from 1999 to 2000 was mainly driven by the increase of the quality of money in Japan, as the quality of Euro and US dollar was decreasing during that period (Figure 7). Figure 7 also reveals that sharp decline in 2008 was mainly caused by the decrease of the quality of Euro and US dollar – the quality of Euro dropped by 33.28 points (from 52.27 in 2007 to 18.99 in 2008) and the quality of US dollar dropped by 39.94 points (from 53.96 in 2007 to 14.02 in 2008). In comparison, the value of the Japanese Yen decreased only by 7.61 points during the same period. The summary of the values at the beginning and at the end of the period under research as well as the minimum and maximum values are provided in Table 4 below.

**Table 4. Summary of the values of the composite indicator of quality of money in Euro area, Japan and USA (scale: 0-100)**

| Region | Value in 1999 | Value in 2019 | Change in value | Mean | Min | Max |
|---|---|---|---|---|---|---|
| **Euro area** | 60.29* | 43.81 | -16.48 | 47.25 | 18.99 (2008) | 60.29 (2000) |
| **USA** | 56.41 | 61.23 | +4.82 | 48.35 | 14.02 (2008) | 61.23 (2019) |
| **Japan** | 47.31 | 47.71 | +0.40 | 57.99 | 42.72 (2014) | 72.40 (2007) |

\* in 2000

*Regional analysis.* The results of the calculated indicator of the quality of money revealed that historically the quality of Euro and US dollar has been similar (Figure 7). Several periods of major changes can be distinguished. The first one was from 1999 to 2007 – the initial decrease which was mainly driven by the decreasing quality of the central banks' balance sheet, decreased interest rates and increasing inflation[5] (Figure 8 and Figure 9).
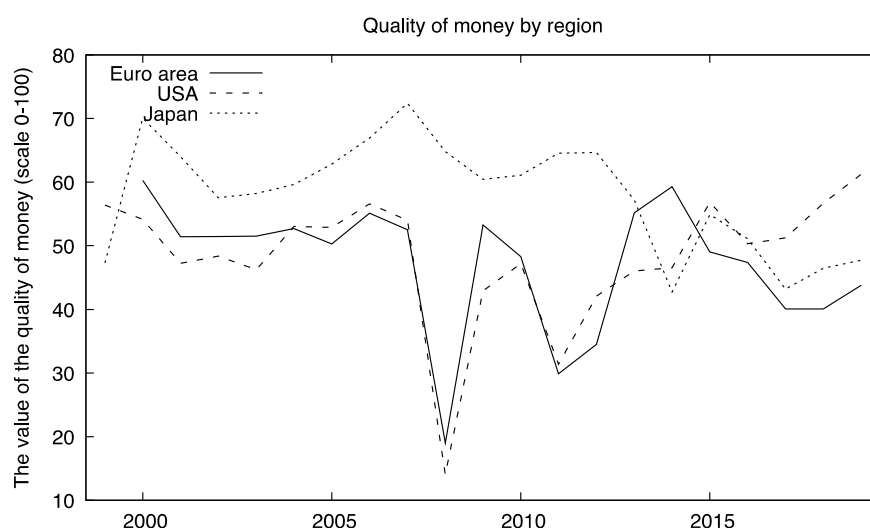


*Figure 7.* **Composite indicator of the quality of money for Euro area, Japan and USA (scale: 0-100)**
*Note. Calculated using statistical program – Gretl*

The decrease of the quality of the ECB's balance sheet was quite notable, while the drop in FED's balance sheet's quality was not that significant. In case of ECB, it was mainly due to the rapidly falling liquidity, i.e. the value of gold was growing much slower than the monetary base, and the amount of reserve assets was also diminishing. The value of

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[5] The graphs of the Financial stability and Inflation should be interpreted from the different perspective: financial stability is measured by the indicator of systematic stress, therefore, increasing trend on the graph shows the decreasing financial stability, i.e. on a scale from 0 to 100, 100 means high financial stress, while 0 – no stress. 0 on the graph of inflation implies for high inflation, while 100 – low inflation.

foreign assets as well as the ratio of equity to total assets were also decreasing and all these factors resulted in a diminishing liquidity of the central banks' balance sheet. Moreover, during this period both FED and ECB decreased the interest rates, and USA suffered from volatile fluctuations of the interest rate.

The second period from 2007 to 2014 was marked with high fluctuations in the quality of Euro and US dollar. The quality of the balance sheet of ECB was in further steady decline, while the drop this time was more significant in the quality of the FED's balance sheet. The reasons are the same as listed above – the balance sheet became less liquid. High fluctuations in the money supply can also be observed during this period in all the regions. It was mainly caused by rapidly growing monetary base and M1 monetary aggregate. After the initial decrease of the interest rates, central banks started increasing them steadily from 2002/2003, however, in light of the financial crisis they dropped again, only BOJ has kept them steady for several years. It also caused a sharp decline in the stability of the financial system. As a result of the financial crisis, central banks were implementing measures aimed at saving the financial sector, e.g. increasing money supply and significantly decreasing interest rates. Both these factors contributed to the decline the in quality of money since more money appeared in circulation and for a cheaper price.

The last period that can be distinguished was from 2014 to 2019. During this period the quality of Euro continued to decline due to further declining liquidity of the balance sheet. The value of Yen has been declining as well. Money supply in all of the regions was growing. Both ECB and BOJ have kept the interest rates at low levels, while FED increased them significantly to the highest ones throughout the whole period under research. This was also the main driver for the quality of US dollar to increase in the last period. The indicator of financial stability has recovered after the financial crisis and remained stable.

To sum up, the decisions and monetary policy of BOJ have managed to keep the quality of Yen stable during the period under research, while Euro and US dollar suffered from fluctuations and financial shocks that lead to significant jumps of the quality of money.

**Sub-indicator: Balance Sheet**

**Sub-indicator: Money supply**

**Sub-indicator: Interest rate**
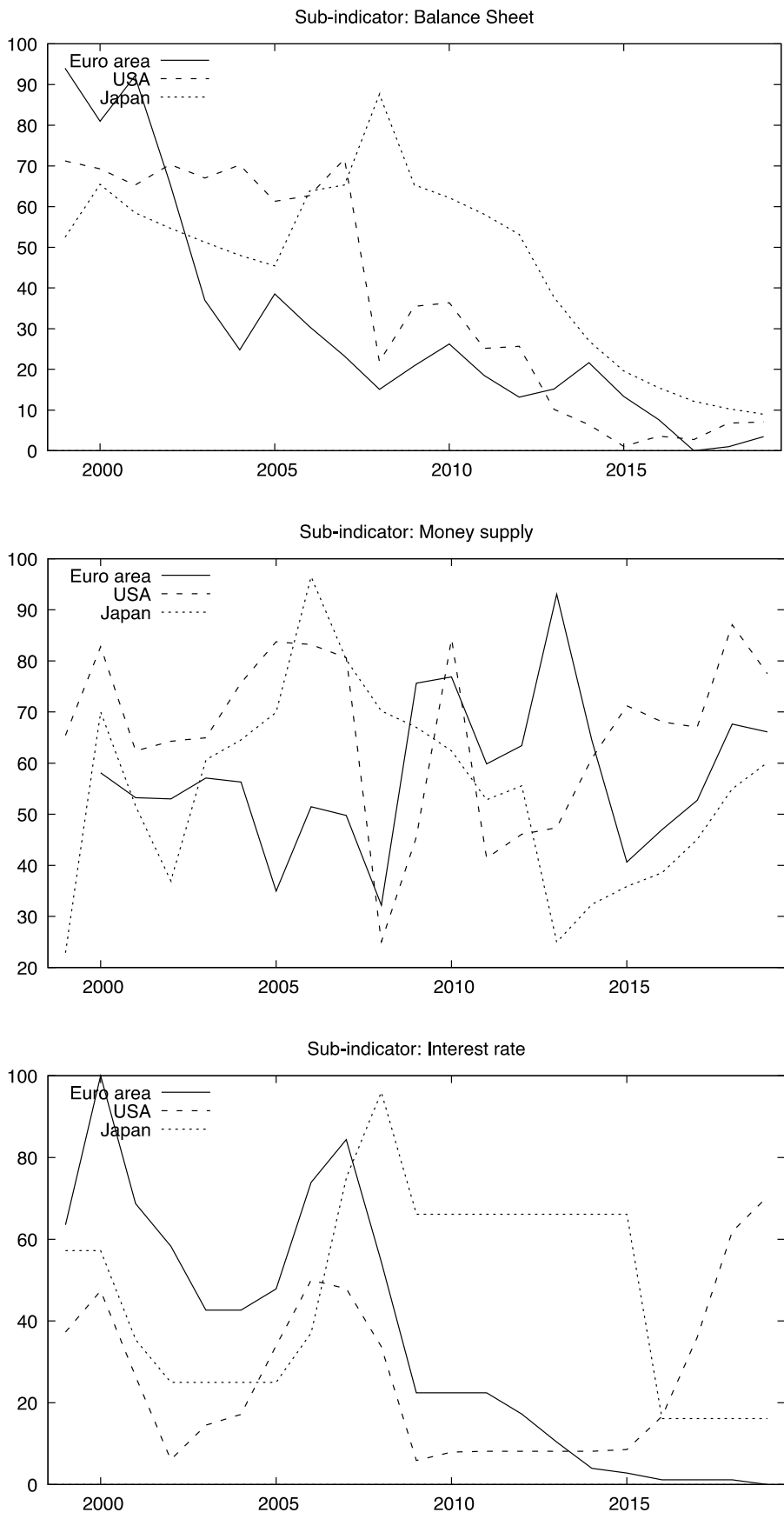
*Figure 8. Sub-indicators of the composite indicator I*

**Sub-indicator: Financial stability**

**Sub-indicator: Inflation**
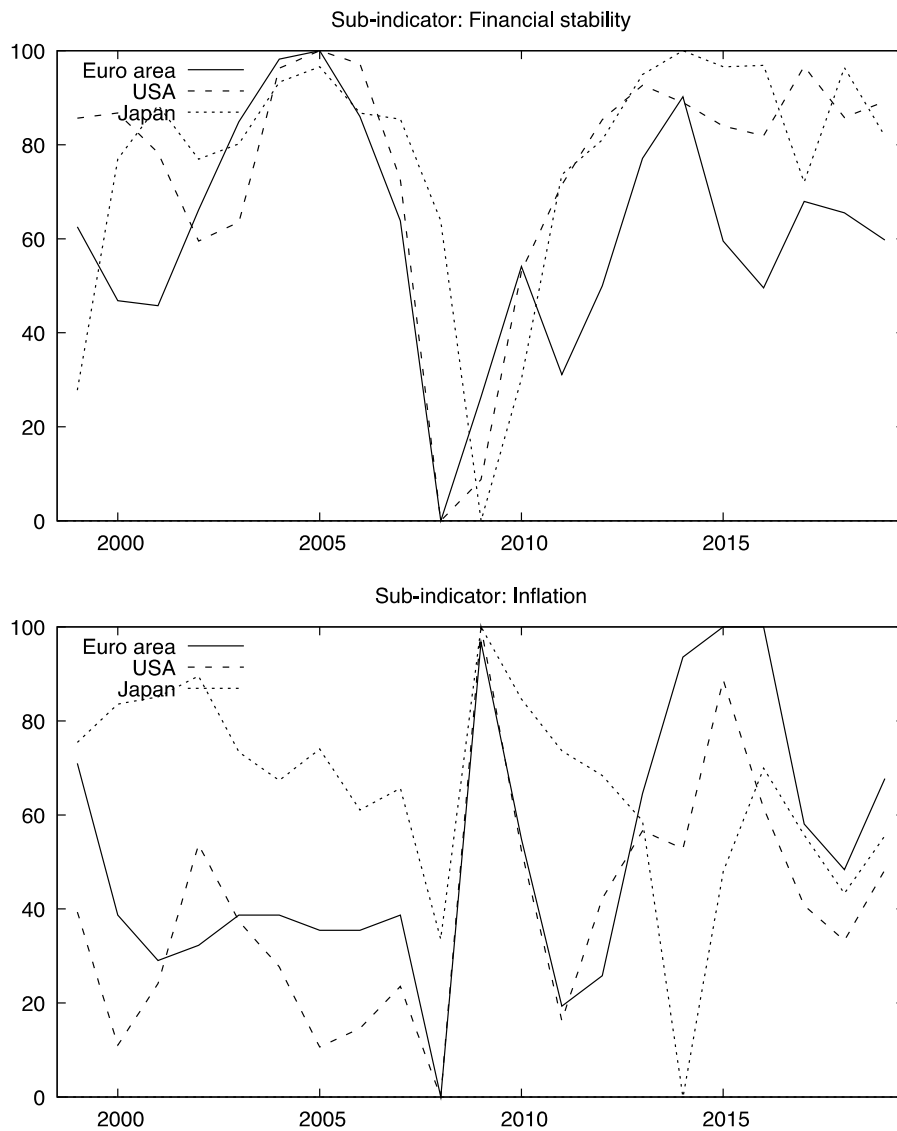
***Figure 9. Sub-indicators of the composite indicator II***
*Note. Figure 8 and Figure 9 calculated using statistical program – Gretl*

## 4.2. Results of the empirical study on the impact of the quality of money on FDI

After the quantifiable measure of the quality of money has been developed, the impact of the composite indicator was empirically explored on both inward and outward FDI flows separately. The impact was tested for each of the regions separately by restricting the sample in econometric software and employing panel regression analysis for Euro area and multiple regression analysis for Japan and USA.

Before the regressions were run, the Augmented Dickey-Fuller tests were performed for each of the variables to check for stationarity. The mentioned test identifies whether the

unit root is present. The null hypothesis states that it is present, however, for all of the variables it was rejected. Therefore, all variables (dependent and independent) were transformed into log differences form which eliminated the problem of stationarity. To control for time effects, time dummies were included in panel regressions.

***The impact of the quality of money on FDI in Euro area.*** The impact was tested on a panel of original Euro area countries, namely Austria, Belgium, Finland, France, Germany, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain. The primary models to test the impact of the quality of money on FDI in Euro area were created using pooled OLS and the panel diagnostics was performed in order to choose the most appropriate model. Joint significance of differing group means tests were performed, the outcomes of which suggested that OLS is adequate for further analysis in both cases, i.e. for inward and outward FDI. Next, the heteroscedasticity and normality of residuals were tested. The tests for normal distribution showed low p-values, thus the null hypothesis stating that residuals are normally distributed was rejected. However, the issue of not normal distribution of residuals does not have a significant effect on the efficiency of estimates when the sample size is relatively large (>15) (Kelly, 2014). The sample size employed in this study is way larger, thus the problem was not further examined.

In order to test heteroscedasticity, distribution free Wald tests were performed, and the obtained p-values also indicate the presence of the problem in both models. Heteroscedasticity occurs when the variance of the error term is not constant over time. It can provide inefficient and biased estimates. Thus, if possible, the issue is recommended to be eliminated. The most frequently used techniques to do that include Robust Standard Errors (RSE) and WLS, therefore, they are employed in this study as well. From Table 5, it can be seen that the adj. $R^2$ has increased from 0.46 to 0.59 for inward FDI model and from 0.36 to 0.51 for outward FDI, which can indicate that the coefficient estimates provided by WLS are more efficient. Nevertheless, the decision about the best model should not be only based on the single statistic. Taking into consideration higher Akaike criterion and the distribution of significant variables, the conclusion was made that WLS has provided poorer results due to limitations of the model discussed in the previous chapter of this paper. On these grounds, the models chosen for further interpretation are OLS with robust standard errors.

**Table 5. Summary of the models employed for estimation of the impact in Euro area**

| | Inward FDI | | Outward FDI | |
|---|---|---|---|---|
| | OLS Robust Standard Errors | WLS | OLS Robust Standard Errors | WLS |
| **n** | 203 | 203 | 192 | 192 |
| **Adj. R2** | 0.46 | 0.59 | 0.36 | 0.51 |
| **Akaike criterion** | -263.05 | 633.14 | -257.08 | 664.69 |
| **lnL** | 155.52 | -291.57 | 151.54 | -306.34 |

*Note. Calculated using statistical program – Gretl*

When the final models for further analysis were chosen, backward elimination procedure of explanatory variables was applied, i.e. independent variables that were not found to be statistically significant were eliminated one by one starting from the one with the highest p-value. The final models contain only statistically significant explanatory variables (p-value<0.05). The summarized results are presented in Table 6. Lastly, Wooldridge tests for autocorrelation in panel data were performed for each of the regressions. With the p-values higher than 0.05 the null hypothesis stating that there is no first-order autocorrelation was accepted for both regressions.

The results show that the indicator of the quality of money is significant (at 99.9% level) when testing the impact of explanatory variables on inward FDI. The coefficient of the quality of money in the regression of outward FDI is also positive and statistically significant, however, at the lower (90%) significance level (Table 6). The coefficients are positive meaning that if the quality of money would increase by 1 percent, the inward FDI stock would increase by approx. 0.28%, while outward FDI by approx. 0.11%. Moreover, the lagged by one year value of the quality of money has a statistically significant (at 99.9% level) negative effect on outward FDI (which supports the third hypothesis formulated in this thesis). The value of the coefficient suggests that an increase of the quality of money by 1% would result in a decrease of approx. 0.1% in outward FDI of the following year. More detailed discussion of results is provided further in the section *4.3 Interpretation of the results of empirical study of this thesis.*

***The impact of the quality of money on FDI in Japan and USA.*** The impact of the quality of money on FDI in Japan and USA was tested using multiple regression analysis. The primary models were again created by employing OLS. As mentioned in the previous chapter of the thesis, several assumptions must be tested during multiple regression analysis, i.e. residuals should be normally distributed, there should be linear relationship between the dependent and explanatory variables, there should be no multicollinearity and heteroscedasticity problems. Test for normal distribution of residuals was performed in all four regressions (i.e. testing the impact on inward and outward FDI in Japan and USA separately) and the null hypothesis stating that error is normally distributed was accepted in all of them. Non-linearity test was also performed, and the results confirmed that relationship between dependent and independent variables is linear. Multicollinearity was tested with the help of correlation analysis which revealed that there is no high and statistically significant correlation among the independent variables, therefore, multicollinearity problem is not present. Lastly, heteroscedasticity was tested using Breusch-Pagan test, the null hypothesis of which states that there is no heteroscedasticity problem. With p-values higher than 0.05 this hypothesis was accepted in all of the regressions. Additionally, all regressions were tested for autocorrelation using Durbin-Watson statistic. The value of this statistic ranges from 0 to 4, where the value between 0 and 2 indicates positive autocorrelation, between 2 and 4 – negative autocorrelation and 2 – no autocorrelation. The results of the test show that there is no significant autocorrelation in all four regressions.

The results of the final regressions revealed that the indicator of the quality of money has no statistically significant impact on neither inward nor outward FDI in Japan. On the other side, the quality of US dollar was found to have a statistically significant (at 99.9% level) positive impact on both inward and outward FDI in USA.

To sum up, based on the results of the empirical study performed some of the hypotheses raised in the previous chapter of this thesis are accepted and some rejected. The link of the results of empirical study with theoretical framework as well as the limitations of the study are presented in the following sections.

**Table 6. Summary of the results of empirical study on the impact of the quality of money on FDI**

| | Inward FDI | | | Outward FDI | | |
|---|---|---|---|---|---|---|
| | Euro area | Japan | USA | Euro area | Japan | USA |
| $\Delta$**ln***QoM* | 0.28*** | | 0.21*** | 0.11** | | 0.38*** |
| | (0.02) | | (0.05) | (0.04) | | (0.07) |
| $\Delta$**ln***QoM_1* | | | | -0.10*** | | |
| | | | | (0.02) | | |
| $\Delta$**ln***LPROD_1* | 7.26* | -28.54* | | | | |
| | (3.26) | (14.49) | | | | |
| $\Delta$**ln***LCOST_1* | | | 1.53*** | | | |
| | | | (0.43) | | | |
| $\Delta$**ln***TAX_1* | -0.48** | | -0.68** | | | |
| | (0.15) | | (0.25) | | | |
| $\Delta$**ln***GDPpc_1* | -7.78** | 29.08* | | | | |
| | (3.45) | (14.57) | | | | |
| $\Delta$**ln***TOPEN_1* | 0.49** | | | 0.50* | | |
| | (0.18) | | | (0.23) | | |
| $\Delta$**ln***FDIOP_1* | | | | 0.20*** | | |
| | | | | (0.04) | | |
| $\Delta$**ln***RDINV_1* | | | | | | -2.99** |
| | | | | | | (1.36) |
| $\Delta$**ln***REER* | | | | | -0.72*** | |
| | | | | | (0.14) | |
| **constant** | 0.01 | 0.27** | 0.07** | 0.06*** | 0.08*** | 0.03 |
| | (0.02) | (0.11) | (0.03) | (0.02) | (0.01) | (0.03) |
| **R2** | 0.52 | 0.22 | 0.7 | 0.43 | 0.59 | 0.67 |
| **Observations** | 203 | 19 | 19 | 192 | 20 | 19 |

*Note. *** p-value ≤ 0.001, ** p-value ≤ 0.01, * p-value ≤ 0.05. Meaning of numbers in the table: coefficient, p-value level, (standard error). The table contains statistically significant explanatory variables only. Calculated using statistical program – Gretl*

**Table 7. The conclusions about hypotheses formulated in this thesis based on the results of empirical study**

| Hypothesis | Accepted/ rejected |
| --- | --- |
| H01: The quality of money in Euro area, Japan and USA has decreased over the period under research given the increasing demand for financial assets | **Accepted** |
| H02: There is a statistically significant negative relationship between the quality of money and outward FDI in Euro area, Japan and USA. | **Partially accepted** |
| H03.1: There is a statistically significant positive relationship between the quality of money and inward FDI in Euro area. | **Accepted** |
| H03.2: There is a statistically significant positive relationship between the quality of money and inward FDI in Japan. | **Rejected** |
| H03.3: There is a statistically significant positive relationship between the quality of money and inward FDI in USA. | **Accepted** |

## 4.3.    Interpretation of the results of empirical study of this thesis

Theoretical framework as well as previous empirical studies discussed in the second chapter of this thesis suggested a positive impact of the quality of money on inward FDI as one of the factors that attract it. The results of empirical study confirm such relationship in Euro area and USA. Based on the estimates of regression analyses, it can be confirmed that the quality of Euro and US dollar indeed contribute to the attractiveness of a country for FDI. For a better understanding of results, it is essential to refer back to some components of the composite indicator measuring the quality of money. According to the theoretical framework as well as the calculation methodology of the indicator, better quality of money is achieved when the supply of money is higher and the financial system in a country is stable. Greater supply implies for a higher demand for money, which means that market participants prefer to use money over investment into non-monetary assets. It also results in a greater consumption and spending, i.e. higher demand for goods produced or services provided in that market, which is one of the determinants for the investor choosing the country for further expansion of his firm. Therefore, it is in line with the conclusions of the previous studies that bigger market and higher consumption contribute

to the attractiveness of a country for FDI (Bevan & Estrin, 2000; Hintošová et al., 2020; Adegboye et al., 2020).

Another component that is of a great importance is the stability of the financial system and currency – the greater the stability, the higher the quality of money. It has been confirmed by a number of studies that unstable currency is one of the main factors impeding the inflows of FDI (Hara & Razafimahefa, 2005), since instability of the currency is associated with high exchange risk (Chakrabarti, 2001). In comparison to the investments into stock markets and portfolios, FDI is more affected by the higher volatility of the currency in a way that the funds cannot be repatriated that fast or hedged as in stock markets, therefore, instable currency may lead to material losses. As a result, investors prefer countries with stable currency and financial system.

As opposed to the Euro and US dollar, no statistically significant relationship was found between the quality of Yen and both inward and outward FDI in Japan. Inflows of FDI into Japan are in general at low levels due to the existing barriers of trade and foreign investment. The main obstacles include: language, high business and labour costs, culture, and high administrative burden (EY; JETRO, 2008). Therefore, in order to attract more inward FDI, Japan should firstly focus on policies aiming to eliminate the mentioned barriers.

Analysis of the trends of FDI flows revealed that the volume of outward FDI from Japan has increased significantly over the past decade while the calculated index of the quality of money shows a slight decrease in the quality of Yen. No statistically significant impact of the quality of Yen on outward FDI implies that decisions of Japanese investors related to foreign expansion are influenced more by other factors, e.g. REER. The empirical results show a statistically significant negative relationship between the REER and outward FDI, which is the opposite from what has been expected. However, the negative sign could be explained by the fact that appreciation of Yen causes a loss of competitiveness for domestic firms, which could reduce the outflows of FDI in cases where exports and FDI are complements (De Santis, Anderton, & Hijzen, 2004).

The impact of the quality of money on outward FDI was expected to be negative, since poorer quality of money encourages market participants to shift from using money as a store of value to other financial assets, FDI being one of them. However, empirical results show that the quality of Euro and US dollar has a statistically significant positive impact

on outward FDI in Euro area and USA. Only the quality of the last year's Euro was found to have an expected negative effect on outward FDI, which is in line with the theoretical framework reviewed in the second chapter of this thesis and represents the lagged effect since decisions related to FDI are not made as quickly as those related to portfolio management.

The positive impact of the current year may be explained as the short-term effect when investors see the improving quality of money and treat it as increasing stability of financial system which in turn increases their confidence. However, in the long run, increasing supply of money decreases its purchasing power and further increases of the quality of money would have a negative effect on outward FDI.

All in all, it can be concluded that most of the hypotheses tested in this study have been accepted or partially accepted (Table 7) and the results are in line with the theoretical framework discussed in previous parts of the thesis. This also provides additional confidence in the reliability of the new composite indicator measuring the quality of money.

## 4.4.    Limitations of the empirical study performed in this thesis

One of the main limitations of this study is time restriction and limited availability of historic data on the components of composite indicator. The time restriction applies to the start of the analysed period. Since Euro was first introduced only in 1999, it is not possible to calculate the composite indicator for earlier periods. Data for calculation of the quality of US dollar and Yen is, however, available for earlier periods as well, but for the purpose of comparability, the index was calculated only from 1999 as for Euro. Moreover, the data on some components of the composite indicator that were identified during the literature review is not available for the whole period (e.g. reverse repos, i.e. overnight borrowing by FED, were introduced only in 2013), therefore, such components were excluded from the calculation.

Another limitation is the difference between the monetary policies and institutional structures of the three central banks under analysis (Gerdesmeier, Mongelli, & Roffia, 2007). The initial measure of the quality of money was develop for Euro. The quality of US dollar and Yen were calculated applying exactly the same methodological approach. However, due to the certain differences of the monetary policies (e.g. application of

different interest rates, having different deposit and loan policies), the data for some variables of the composite indicator that was available for Euro area, was not available for USA or Japan. As one of the aims of this thesis was to compare the impact of the quality of money in all three regions, in cases when there was not possibility to substitute the components, they were excluded from calculation. Therefore, the suggestion for further studies would be to create the measure of the quality of money for each of the countries separately taking into account all of the differences and specifics. This would limit the comparability, but the results of the impact on FDI would be more precise. This is also one of the main reasons of estimations for Japan. The policies of BOJ differ the most from ECB's and FED's, therefore, composing independent index for the quality of Yen is highly recommended.

# 5. CONCLUSIONS

The aim of this thesis was to analyse the impact of the quality of money on FDI flows in Euro area, Japan and USA. After the literature review was performed and global trends of FDI were analysed in the second chapter, the research methodology was discussed in the third, and the empirical research was performed in the fourth chapter of the paper, the following conclusions can be drawn:

- In the current world, globalization is an economic phenomenon which provides unlimited business expansion and growth possibilities as well as access to international markets. FDI as a driving force for international economic integration, acts as a tool of creation of the long-term interconnections between the countries. The analysis of the global trends of FDI revealed that fluctuations of the volumes of inflows and outflows has been volatile since 1997. Consequently, the causes of such fluctuations are of a great interest to scholars and researchers in the economic field.

- Literature review revealed a number of factors that have been found to have an impact on the flows of FDI. Among others, the following factors contribute to the host country's attractiveness for FDI: trade openness, labour costs and education level of the labour force, tax rate, monetary policy and general level of economic development. The factors that proved to affect the outward FDI among others include: political risk, globalisation, level of the economic development, R&D investment, size of the market, abundance of skilled-labour, distance between the home and host countries and cost of trade.

- The analysis of the previous studies revealed that monetary policy is one of the factors contributing to the attractiveness of a country to foreign investors, however, no studies testing the relationship between the quality of money and FDI were found. Therefore, the aim of empirical part of this thesis was to analyse such relationship in terms of both inward and outward FDI and to fill in this gap in the research. However, due to the subjective nature of the quality of money, its assessment is relatively complex, and the measure was not developed until recently. The methodology proposed by Žukauskas (2021) was used as the basis for calculation of multidimensional indicator of the quality of money and adapted for the purpose of calculation it for Euro area, Japan and USA. The composite indicator consisting of

the following sub-indicators/dimensions was calculated: central banks' balance sheet, money supply, interest rates, financial system stability and price inflation.

- The process of creation of composite indicator involved a number of steps and specific procedures that are described under the third chapter of this thesis. After the assessment of multidimensional indicator of the quality of money, its impact on inward and outward FDI was tested using panel regression analysis for Euro area and multiple regression analysis for Japan and USA. The period of time under research is from 1999 to 2019, and was mostly based on the availability of data. The most recent statistics were published for 2019, while the beginning of the period is the year (1999) when Euro was introduced. Data for Japan and USA is also collected for the same period for the purpose of comparability of estimation results.

- The results of the multidimensional indicator of the quality of money reveal that over the period from 1999 the quality of money in Euro area has decreased, the quality of money in Japan remained almost unchanged, and the quality of money in USA has increased. The changes, however, did not follow the steady trend and there were quite significant fluctuations in between. The results show that historically the fluctuations of the quality of Euro and US dollar has been similar, while the quality of Yen was more stable. The fluctuations were mainly caused by the decreasing quality of the central banks' balance sheet, decreased interest rates, increasing inflation as well as money supply.

- The results of empirical study confirm that there is statistically significant relationship between the quality of money and both inward and outward FDI in Euro area and USA. Based on the estimates of regression analyses, it can be confirmed that the quality of money indeed contributes to the attractiveness of these regions for FDI, in a way that higher quality of money leads to greater demand for money and more consumption in a host country. Therefore, it is in line with the conclusions of the previous studies that bigger market and higher consumption contribute to the attractiveness of a country for FDI.

- As opposed to the Euro area and USA, no statistically significant relationship was found between the quality of money and both inward and outward FDI in Japan. This is due to the fact that there is a number of trade and foreign investment barriers in Japan (e.g. language, high business and labour costs) that impede inward FDI in

general. Therefore, in order to attract more FDI inflows, Japan should firstly focus on policies aiming to eliminate the mentioned barriers. No statistically significant impact of the quality of money on outward FDI implies that decisions of Japanese investors related to foreign expansion are influenced more by other factors, e.g. REER. The empirical results show a statistically significant negative relationship between the REER and outward FDI, which is related to the fact that appreciation of Yen causes a loss of competitiveness for domestic firms, which could reduce the outflows of FDI in cases where exports and FDI are complements.

- Empirical results have shown that the quality of money of the current year has a statistically significant positive impact on outward FDI in Euro area and USA, and the quality of the last year's money – negative effect. The positive impact of the current year may be explained as the short-term effect when investors see the improving quality of money and treat it as increasing stability of financial system, which in turn increases their confidence. However, in the long run, increasing supply of money decreases its purchasing power and increasing quality of money would have a long-term negative effect on outward FDI.

- Finally, it can be concluded that most of the hypotheses tested in this study have been accepted or partially accepted and the results are in line with the theoretical framework discussed in previous parts of the thesis. This also provides additional confidence in the reliability of a new multidimensional indicator of the quality of money.

- The study, however, also has several limitations: time restriction and limited availability of historic data on the components of composite indicator as well as the differences between the monetary policies and institutional structures of the three central banks under analysis. Due to unavailability of the data and mentioned policy differences, some of the variables were excluded from the calculation of the composite indicator of the quality of money. Therefore, the suggestion for further studies would be to create the measure of the quality of money for each of the countries separately taking into account all of the differences and specifics. This would limit the comparability, but the results of the impact on FDI would be more precise.

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# Annexes

## Annex 1. Glossary of terms

| Term | Definition |
| --- | --- |
| **FDI** | A package of capital, technology, management, and entrepreneurship, which allows a firm to operate and provide goods and services in a foreign market (Farrell, 2008:5). |
| **Full employment** | The situation when the unemployment rates are at the lowest levels and there is no involuntary unemployment (Rees, 1957). |
| **Good money** | Money that has the following qualities: utility and value, portability, durability, divisibility, homogeneity, stability of value, cognoscibility (Bagus, 2009) |
| **Heteroscedasticity** | The situation when the assumption of homoscedastic error terms is breached, i.e. when the variance of the error term is not constant over time (Wooldridge, 2009). |
| **Inward FDI** | A type of investment made by the foreign investor into a host jurisdiction (UNCTAD, 2007). |
| **Money** | Whatever serves society in four functions: as a medium of exchange, a store of value, a unit of account, and a standard of deferred payment (OpenStax Economics, 2016). |
| **Multicollinearity** | Situation when there is statistically significant linear correlation between explanatory variables (Wooldridge, 2009). |
| **Outward FDI** | A type of investment made by the local investor into a foreign jurisdiction (Perea, 2017). |
| **Quality of money** | The capacity of money, as perceived by actors, to fulfil all its main functions, namely to serve as a medium of exchange, as a store of wealth, and as an accounting unit (Bagus, 2009:22-23) |
| **Quality theory of money** | The theory that takes into account not only the supply side of money, but also other factors such as durability, portability and other that impact the demand of money (Mariana, [1609] 1994; Petty, [1662] 1889; Jevons, 1875; Rothbard, 2008). |
| **Quantity theory of money** | The theory that states that the changes of the prices of the goods and services correspond to the changes in the supply of money (Newcomb, 1885; Foville, 1907; Fisher, 1911; Mises, 1912). |
| **Velocity of money** | The frequency of the exchange of money in the economy, i.e. the rate at which market participants spend money (Kenton, 2020). |

**Annex 2. Correlation matrix between the variables of composite indicator**

| | LIQ_1 | LIQ_2 | LIQ_3 | DEFPOT | EXTSTR | EQUITY | GMB | GBS | GM1 | GM3 | DFR | MLF | FINSTAB | INFL |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LIQ_1 | 1.00 | | | | | | | | | | | | | |
| LIQ_2 | 0.75 | 1.00 | | | | | | | | | | | | |
| LIQ_3 | 0.77 | 0.88 | 1.00 | | | | | | | | | | | |
| DEFPOT | 0.56 | 0.70 | 0.56 | 1.00 | | | | | | | | | | |
| EXTSTR | 0.41 | 0.64 | 0.42 | 0.80 | 1.00 | | | | | | | | | |
| EQUITY | 0.68 | 0.69 | 0.87 | 0.31 | 0.24 | 1.00 | | | | | | | | |
| GMB | -0.14 | -0.26 | -0.32 | -0.23 | -0.07 | -0.17 | 1.00 | | | | | | | |
| GBS | -0.08 | -0.04 | -0.09 | -0.19 | 0.10 | 0.07 | 0.77 | 1.00 | | | | | | |
| GM1 | -0.29 | -0.33 | -0.37 | -0.12 | -0.16 | -0.20 | -0.03 | -0.29 | 1.00 | | | | | |
| GM3 | -0.10 | -0.02 | -0.11 | 0.22 | 0.38 | -0.07 | 0.25 | 0.24 | 0.26 | 1.00 | | | | |
| DFR | 0.09 | 0.18 | 0.31 | -0.06 | 0.11 | 0.32 | 0.21 | 0.46 | -0.24 | 0.05 | 1.00 | | | |
| MLF | 0.53 | 0.45 | 0.55 | 0.50 | 0.43 | 0.43 | -0.09 | 0.05 | -0.47 | 0.14 | 0.25 | 1.00 | | |
| FINSTAB | 0.08 | -0.07 | -0.02 | 0.05 | -0.05 | 0.09 | 0.28 | 0.23 | -0.04 | 0.02 | 0.08 | -0.03 | 1.00 | |
| INFL | 0.09 | 0.14 | 0.11 | 0.42 | 0.25 | -0.10 | 0.00 | 0.07 | -0.23 | 0.17 | -0.03 | 0.47 | -0.11 | 1.00 |

**Annex 3. Full weighting procedure of sub-indicators of the composite indicator**

| Sub-indicator | Weights | $R^2$ | Weights | $R^2$ | Weights | $R^2$ | Weights | $R^2$ |
|---|---|---|---|---|---|---|---|---|
| Balance Sheet | 20% | 42% | 16% | 30% | 14% | 24% | **13%** | **23%** |
| Money supply | 20% | 22% | 20% | 22% | 20% | 21% | **20%** | **20%** |
| Interest rate | 20% | 28% | 19% | 20% | 19% | 17% | **20%** | **18%** |
| Financial stability | 20% | 20% | 20% | 20% | 20% | 20% | **20%** | **20%** |
| Inflation | 20% | 5% | 25% | 14% | 27% | 19% | **27%** | **19%** |
| | STD | 13% | STD | 6% | STD | 3% | **STD** | **2%** |

**Annex 4. Final weights assigned to sub-indicators and variables of the composite indicator**

| Sub-indicator | Weight of sub-indicator | Variable | Weight of variable |
|---|---|---|---|
| **Balance sheet** | 13.00% | LIQ_1 | 1.44% |
| | | LIQ_2 | 1.44% |
| | | LIQ_3 | 1.44% |
| | | DEFPOT | 2.17% |
| | | EXTSTR | 2.17% |
| | | EQUITY | 4.33% |
| **Money supply** | 20.00% | GMB | 5.00% |
| | | GBS | 5.00% |
| | | GM1 | 5.00% |
| | | GM3 | 5.00% |
| **Interest rate** | 20.00% | DFR | 10.00% |
| | | MLF | 10.00% |
| **Financial stability** | 20.00% | FINSTAB | 20.00% |
| **Inflation** | 27.00% | INFL | 27.00% |