CHARLES UNIVERSITY
FACULTY OF SOCIAL SCIENCES
Institute of Economic Studies

Assessment of AML/CFT Practices and Suspicious Activity Reporting in the European Union Member States

Bachelor's Thesis

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Year of defense: 2023

Declaration of Authorship

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Prague, July 30, 2023

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Abstract

This thesis presents an analysis of potential drivers of the numbers of suspicious transactions as precursors to money laundering conducted on the European Union Member States between 2016 and 2021, and subsequently assesses the efficiency of the existing list of EU-recognized predicate offences to money laundering and financing of terrorism during this time period. Another contribution of this thesis is the consideration of the COVID-19 pandemic and assessment of its potential effects. This thesis used a newly compiled dataset containing EU-recognized predicate offences, enforcement factors, and macroeconomic indicators. Based on the results of this analysis, the main drivers of suspicious transaction levels in the European Union between 2016 and 2021 were drug-related offences and the presence of the global pandemic of COVID-19. Subsequently it was concluded that the list of predicate offences as recognized by the European Union was possibly not efficient in identifying plausible streams of money laundering during the analyzed period. Policy recommendations that could arise from this analysis include promoting consistent reporting of indicators used in international legislation to allow for the development of a stronger data-based structure for further policy evaluation and improvement.

JEL Classification	K42, O17, O52, P37, C23, K33
Keywords	AML, Money Laundering, Suspicious Transaction Report, Predicate Offence
Title	Assessment of AML/CFT Practices and Suspicious Activity Reporting in the European Union Member States

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Abstrakt

Tato práce představuje analýzu potenciálních faktorů ovlivňujících počet podezřelých transakcí jako prekurzorů praní špinavých peněz oznámených v členských státech Evropské unie mezi lety 2016 a 2021. Následně také v tomto období hodnotí účinnost stávajícího seznamu predikativních trestných činů pro praní špinavých peněz a financování terorismu uznávaného Evropskou unií. Dalším přínosem této práce je zohlednění pandemie COVID-19 a posouzení jejích možných dopadů na oznámené podezřelé transakce a tím přeneseně na praní špinavých peněz. V této práci byl použit nově sestavený soubor dat obsahující predikativní trestné činy uznávané Evropskou unií, faktory prosazování práva a makroekonomické ukazatele. Na základě výsledků analýzy obsažené v této práci byly hlavními hnacími silami počtu oznámených podezřelých transakcí v Evropské unii v letech mezi 2016 a 2021 drogové trestné činy a přítomnost globální pandemie COVID-19. Následně byl učiněn závěr, že seznam predikativních trestných činů, jak jej uznává Evropská unie, pravděpodobně nebyl účinný při identifikaci možných toků praní špinavých peněz během analyzovaného období. Politická doporučení, která by mohla z této analýzy plynout, zahrnují podporu konzistentního vykazování ukazatelů používaných v mezinárodních právních předpisech, aby bylo možné vytvořit pevnější strukturu založenou na analýze získaných dat pro další hodnocení a zlepšování legislativy.

Klasifikace JEL	K42, O17, O52, P37, C23, K33
Klíčová slova	AML, praní špinavých peněz, hlášení o podezřelých transakcích, predikativní trestný čin
Název práce	Hodnocení postupů v oblasti AML/CFT a hlášení podezřelých aktivit v členských státech Evropské unie
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Acknowledgments

The author of this thesis would like to express her gratitude, especially to Mgr. Magda Pečená, Ph.D., who shared valuable knowledge and guidance throughout this research journey. Her advice and constructive feedback were invaluable in the completion of this thesis. Communication was always impeccable and punctual, for which the author is truly grateful. The author is also thankful for the feedback and proofreading provided by friends and family, which made the final stages of the process much easier.

Typeset in FSV LaTeX template with great thanks to prof. Zuzana Havrankova and prof. Tomas Havranek of Institute of Economic Studies, Faculty of Social Sciences, Charles University.

Bibliographic Record

Vandasová, Daniela: *Assessment of AML/CFT Practices and Suspicious Activity Reporting in the European Union Member States.* Bachelor's Thesis. Charles University, Faculty of Social Sciences, Institute of Economic Studies, Prague. 2023, pages 81. Advisor: Mgr. Magda Pečená, Ph.D.

Contents

List of Tables

List of Figures

Acronyms

AML anti-money laundering

AMLA EU AML Authority

AMLD Anti-Money Laundering Directive

CAST Conflict Assessment System Tool

CEBS Committee of European Banking Supervisors

CFT counter-financing terrorism

EBA European Banking Autority

EMCDDA European Monitoring Centre for Drugs and Drug Addiction

ESFS European System of Financial Supervision

EU European Union

EUROPOL European Union Agency for Law Enforcement Cooperation

FATF Financial Action Task Force

FFP Fund for Peace

FIU Financial Intelligence Unit

FSI Fragile States Index

FSRB FATF-Style Regional Body

G20 Group of Twenty

ICCS International Classification of Crime for Statistical Purposes

ICRG International Co-operation Review Group

IMF International Monetary Fund

MIMIC Multiple Indicators and Multiple Causes

MER Mutual Evaluation Report

NCA National Competent Authority

OECD Organisation for Economic Co-operation and Development

STR Suspicious Transaction Report

TE-SAT Terrorism Situation and Trend

UN United Nations

UNODC United Nations Office on Drugs and Crime

WHO World Health Organization

Chapter 1

Introduction

Money laundering is a criminal act committed to disguise the origins of funds obtained from illicit activities to give them the appearance of legitimacy. This process enables criminals to blend their illegally obtained wealth into the economy without drawing attention to the associated criminal activities or individuals.

The first anti-money laundering directive was introduced in the European Union (EU) in 1990 to protect the international financial system from being exploitation for money laundering purposes. Since then, the anti-money laundering (AML)/counter-financing terrorism (CFT) legislation in the EU has undergone numerous amendments to improve the framework in response to emerging threats and existing loopholes (European Commission 2023b). In 2015, the European Union introduced an updated framework which included the 4th Anti-Money Laundering Directive. This was then amended by the 5th Anti-Money Laundering Directive in 2018.

The theoretical benchmark for this thesis is provided by the work of Chaikin (2009), Braun *et al.* (2016), and Reganati & Oliva (2018). Chaikin assessed the efficiency of Suspicious Transaction Report (STR) systems through primary document evaluations and observations at the Financial Action Task Force (FATF) Plenary meetings. The FATF is a leading global institution that issues methodology and published the International Standards on Combatting Money Laundering and the Financing of Terrorism and Proliferation, an internationally recognized set of recommendations to fight mnoney laundering and financing of terrorism. The FATF Plenary is the FATF's decision-making body. Suspicious Transaction Reports are documents prepared by reporting entities, most often financial institutions, and delivered to the local Financial

Intelligence Unit (FIU) for further analysis, when there are reasonable grounds for suspicion that funds involved in a transaction are from an illicit source or are used for financing of terrorism. A financial intelligence unit is a state-established entity for, among other responsibilities, the analysis of STRs and communication with other FIUs.
Chaikin concluded that the FATF Ratings are objective and consistent in application. The FATF Ratings are scores of individual countries measuring how compliant a country is with the FATF. However, the evaluation of STR systems as a whole is limited due to a lack of reliable statistics. Braun *et al.* explored the potential drivers of STR levels in 54 countries between 2006 and 2012. They concluded that criminal activities, especially terrorism and organized crime, as well as mutual evaluations from the FATF, positively influence the numbers of reported suspicious transactions. Mutual evaluations in the context of this thesis are on-site visits conducted by FATF-appointed professionals to assess the FATF compliance of individual countries.
Reganati & Oliva then explored the determinants of money laundering on a regional level in Italy. They concluded that the determinants differ significantly across regions.

Although extensive research has been conducted, there is no unified consensus among authors on the potential drivers of STR levels or on the efficiency of current AML/CFT frameworks. Additionally, the aforementioned research identified several limitations, such as diverse legislative structures among the analyzed countries and a lack of data reporting on crucial indicators mentioned by the FATF. As a result, authors of the aforementioned literature often had insufficient observations to test their hypotheses and needed to use various proxy variables that might significantly deviate from the original variables under investigation.

Moreover, no comprehensive research has been conducted on the EU as a geographic entity, despite it representing a unique political arrangement that could provide valuable information and benchmarks for the rest of the world. In recent years, in light of the global COVID-19 pandemic, the world has faced a unique economic and social situation that has also brought significant changes to the way regulations and evaluations have been carried out and assessed, compared to previous research.

This thesis therefore aims to make use of the above described unique situation and complex geographic set to investigate potential drivers of STR levels (as precursors to money laundering) through crime-specific, enforcement, and

macroeconomic factors.

There are two research questions to be addressed throughout this thesis making use of several hypotheses and consequent econometric analysis:

1. What were the drivers of STR levels in the EU between 2016 and 2021?
2. Was the list of predicate offences efficient in uncovering the sources of illicit gains in the EU between 2016 and 2021?

To develop a model for this analysis, a complex dataset was compiled combining both international and country-level sources to gather information on the numbers of reported suspicious transactions in each country as well as the numbers of reported offences from the EU-recognized list of predicate offences to money laundering and financing of terrorism. Predicate offences, in the context of this thesis, are criminal activities that, according to the EU or the FATF, generate funds for money laundering or financing of terrorism.

A one-way fixed effects model was developed and optimized based on the theoretical framework provided by previous research. The final results were obtained using robust covariance matrix estimation.

The thesis takes on the following structure:

- Chapter 2 provides a summary of the used literature, previous research outcomes, and discusses the potential drivers of STR levels explored by the existing literature.
- Chapter 3 provides insight into the potential effects of the global pandemic of COVID-19 on the underlying factors discussed as independent variables, and focuses on hypothesis development and expected outcomes based on the literature and predictions of international authorities.
- Chapter 4 presents a full list of variables contained in the dataset, their descriptions and sources as well as methodology for variable matching when combining different sources, and describes data used to estimate the econometric model in the analytical part. This chapter also describes the methodology of variable selection for the model development to overcome multicollinearity issues.
- Chapter 5 describes the methodological approach adopted for estimating the model from selecting the appropriate estimation method to verifying its assumptions and treating their violations.

- Chapter 6 lists and discusses the results of the regression.
- Chapter 7 summarises the findings and provides possible policy recommendations based on the provided results.
- Further information on the global and EU-wide AML/CFT frameworks as well as detailed definitions of the used terms are provided in Appendix A.
- Appendix B includes comprehensive tables and results of running analyses.

During the writing process of this thesis, artificial intelligence was utilized to ease orientation in extensive legal documents, searching for synonyms and refining language structure, and finding helpful examples on LaTeX formatting.

Chapter 2

Literature Review

This chapter aims to provide a comprehensive overview of the existing literature on the matter of AML/CFT. Although the conducted research is extensive, there is no unified consensus among the authors. This chapter therefore provides multiple perspectives on the examined topic (Section 2.1) and lists potential drivers of Suspicious Transaction Reports (STRs)[1] explored by other authors (Section 2.2). Appendix A provides a deeper overview of what money laundering is, definitions of related concepts, and how AML/CFT frameworks operate on a global and European level.

2.1 Existing Theoretical Background

The literature review for this thesis thematically groups related research on the topic, with a chronological emphasis, spanning from 1968 to 2023. Key theoretical references for this thesis include the works of Chaikin (2009), Braun *et al.* (2016), and Reganati & Oliva (2018).

The literature supporting the answers to the research questions stated in Chapter 1 covers estimations of money laundering and other criminal activities, assessments of the main goals and efficiency of AML/CFT frameworks, evidence on potential drivers of STRs as well as opinions on their significance.

2.1.1 The Problem of Money Laundering

In order to properly comprehend the scope of the problem of money laundering it is important to provide a clear and specific definition. This thesis makes use

[1]For a thorough definition of the term "Suspicious Transaction Report," please refer to Appendix A, Section A.1.

of the broad definition provided by van Duyne (1994) as:

> "actions intended to conceal the origin of assets by presenting them as coming from a different, legitimate source."

Essentially, money laundering is an accounting or financial act designed to circumvent the law. Similarly, the UNODC (1988) United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, also known as the Vienna Convention, in Article 3.1 characterizes money laundering as:

> "the conversion or transfer of property, knowing that such property is derived from any offense(s), for the purpose of concealing or disguising the illicit origin of the property or of assisting any person who is involved in such offense(s) to evade the legal consequences of his actions."
>
> *Source:* United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, UNODC (1988).

The UNODC (2023b) estimates that between 2 and 5 percent of global GDP, or something between EUR 715 billion and 1.87 trillion, is laundered around the world annually.

In conclusion, it is apparent that money laundering poses a significant global risk. To effectively counter this risk, a common strategy must be implemented (Reganati & Oliva 2018).

2.1.2 Focus of AML/ CFT Frameworks

The first anti-money laundering legislation was published to address laundering of proceeds from the sale of illegal drugs. Then, the legislation has evolved to encompass also gains from organized crime. In order to carry out criminal activities on a large scale, organized crime groups need to be able to conceal the proceeds of their crimes. This is where money laundering comes in, as it allows criminals to convert their illicit gains into seemingly legitimate funds. Without the ability to launder money, organized crime groups would struggle to operate and expand their operations. The extension of anti-money laundering legislation to include organized crime was therefore an important development in the fight against money laundering. By broadening the scope of the legislation, governments and law enforcement agencies are better equipped to identify

and target criminal activities that go beyond the drug trade (Johnson & Lim 2002). Since then, the anti-money laundering legislation developed to address also other types of illicit activities, often referred as predicate offences[2].

In that matter, Chaikin (2009) adds that AML reporting systems were initially implemented by nations "to counter the underground economy, tax evasion, and money laundering." These systems were created to locate the financiers and victims of crime who had eluded standard investigation methods and remained undetectable. The initial purpose of the AML reporting systems was to make it easier to identify predicate offences, raise the cost of money laundering, and therefore lessen crime.

Isa *et al.* (2015) then point out that since the establishment of the Financial Action Task Force (FATF)[3] in 1989, the internationally recognized organization is considered the leading standard setter for AML/CFT efforts thanks to its methodology publications for supervisors, especially the 40 FATF Recommendations, officially known as the International Standards on Combating Money Laundering and the Financing of Terrorism and Proliferation, the FATF Standards in short.

The FATF Recommendations can help detect criminal activity related to terrorist financing and money laundering, provided they are enforced appropriately (Braun *et al.* 2016; Johnson & Lim 2002), and although the FATF Recommendations do not have the force of international law in a legal sense, they have achieved global recognition and can thus be viewed as a form of non-binding or "soft international law" (Terry 2010).

2.1.3 Estimations of Money Laundering

Countries that have made the political commitment of becoming FATF-compliant are expected to implement the FATF Recommendations through a routine process outlined in their constitutional legislation to comply with the FATF Standards. Avoiding legally binding measures in the FATF Recommendations allows for a flexible foundation that can be tailored to any country's legal requirements. This adaptability enables a wide range of FATF Standards designs and interpretations in the institutional and legislative frameworks for AML/CFT in

[2]For the definition of the term "predicate offence" as used throughout this thesis as well as the full list of FATF-recognized or EU-recognized predicate offences, please refer to Appendix A, Section A.1, and Table A.1.

[3]For a thorough definition of the Financial Action Task Force as well as the structure and further activities of this organization, please refer to Appendix A, Section A.1.

the country. However, given the wide range of potential legal and institutional frameworks that can be put in place by states, nothing beyond a minor or significant departure from the initial norm can be anticipated (Braun *et al.* 2016).

Estimating the amount of money laundering offences and the volume of funds laundered can be a difficult task due to the secretive nature of the offence itself as well as the wide variety of FATF Standards implementations and the consequent considerable deviation from the FATF definition of money laundering in FATF Recommendation 3 and financing of terrorism in FATF Recommendation 5. However, the FATF Recommendation 20 states that if an obliged entity[4] suspects that funds are the proceeds of a criminal activity, it should promptly report its suspicions to the local Financial Intelligence Unit (FIU)[5] in the form of an Suspicious Transaction Report (STR) (FATF 2023d). According to Chaikin (2009), the basic premise of the FATF's framework is that STRs will result in both quantitative and qualitative improvements in law enforcement.

2.1.4 Efficiency of AML/CFT Frameworks

One way of assessing the efficiency of an AML/CFT framework is through mutual evaluations conducted by selected financial experts from the FATF, which are, according to Chaikin (2009), found to be objective and consistent. A mutual evaluation results in a Mutual Evaluation Report (MER) that is discussed during a FATF Plenary meeting and then published on the FATF website. Based on a mutual evaluation, a FATF Rating of a country is appointed[6].

On the other hand, Levi *et al.* (2018) argue that the country risk models commonly used for AML rely on the 3rd round of mutual evaluations, which had low and inconsistent usage of data due to approximately 8-year intervals between reviews. Although the 4th wave of MERs (2014-2022) attempts to be more methodical in data gathering and analysis, the FATF has not yet developed methods that provide adequately explanatory assessments. Levi *et al.* (2018) also note that evaluations often do not consider the costs of enforcement in calculations of framework efficiency.

Another way of looking at a system's efficiency could be through the amount

[4]For the definition of the term "obliged entity" as used throughout this thesis as well as the full list of EU-recognized obliged entities, please refer to Appendix A, Section A.1.

[5]For a thorough definition of the Financial Intelligence Unit as well as the structure and further activities, please refer to Appendix A, Section A.1.

[6]For thorough definitions of terms "mutual evaluation, Mutual Evaluation Report, the FATF Plenary," and "the FATF Rating," please refer to Appendix A, Section A.1.

of STRs that are submitted to an FIU. In case of this method, however, Braun *et al.* (2016) warns that high levels of STRs do not necessarily indicate full compliance with the FATF Standards for AML/CFT. Instead, they may indicate inefficiencies in the AML/CFT system, such as over-reporting due to misinterpretation of reporting obligations[7].

A theoretical framework that enables assessing the sufficiency of reporting criteria is generally lacking and it is debatable whether a large number of STRs represents an effective reporting system. Levi *et al.* (2018) also argue that the use of data in policy development and implementation is neglected. Claims that certain countries have more or less effective systems will be therefore subject to accusations of rather unreliable assessments in the absence of more consistent and systematic data analysis. While this does not imply that AML initiatives and evaluation procedures themselves have no effect, it does lessen their perceived credibility.

The Problem of Over-Reporting According to Johnston & Carrington (2006), the fact that reporting entities may be held responsible for the consequences of money laundering, may lead to many unfounded STRs being submitted to FIUs[8]. Therefore, FIU analysis is crucial. Moreover, a set of many STRs might refer to one money laundering case and only a small percentage of STRs are forwarded by FIUs to law enforcement agencies (Braun *et al.* 2016). However, the initial flood of unsubstantiated reports can dilute the informational value and hamper identification of what is truly relevant (Takats 2007).

2.2 Evidence on the Potential Drivers of STR Levels

Even though direct comparisons between different countries are impaired by incomparable legal, financial or cultural situations of each country, Braun *et al.* (2016) assume that some factors may contribute to the explanation of a given

[7]For example, in Mexico's 2008 mutual evaluation report, the on-site auditors identified numerous flaws in its AML/CFT framework, including a large quantity of low-quality STRs (FATF 2008). Since then, Mexico has implemented significant improvements to its AML/CFT legislation and is now compliant (C) or largely compliant (LC) with most of the FATF Recommendations. As a result, STR levels have adjusted accordingly (FATF 2018; 2021).

[8]This conclusion is also supported by the findings of Takats (2007) who concludes that banks may incur penalties if they do not report instances of money laundering. Nonetheless, overly stringent penalties could lead banks to over-report, flagging transactions that may not necessarily be suspicious.

level of suspicious transaction reporting. According to the key literature supporting this thesis (Chaikin 2009; Braun *et al.* 2016; Reganati & Oliva 2018), there are three common groups of possible determinants of STR levels: crime-specific factors, enforcement factors, and macroeconomic factors.

This section will provide a closer overview of the determinants and the theoretical basis for the choice of variables and hypotheses included in the model presented below.

2.2.1 Crime-Specific Factors

According to the FATF Recommendation 20, an obliged entity needs to determine if a transaction has any potential ties to revenues from committing a predicate offence before deciding whether to report a suspicious transaction. Therefore, it is obvious that the breadth of the definitions of money laundering and financing of terrorism in national legislation may explain the number of reported suspicious transactions. Consequently, it is reasonable to assume that nations that define money laundering more broadly, by encompassing the full spectrum of defined predicate offences in their legislation, will have higher STR levels compared to countries with a narrower definition (Braun *et al.* 2016).

As per specific criminal offences, the research of Braun *et al.* (2016) concluded that "illegal activities, particularly terrorism and organized crime, trigger high levels of STRs[9]".

On a similar note, Reganati & Oliva (2018) concluded that money laundering is more common in areas with higher levels of corruption[10]. Therefore, STRs should also be more frequent in such areas. This is supported by empirical evidence indicating a strong link between corruption and money laundering as corruption generates large sums of money that need to be laundered to appear legitimate. This is an important discovery since Braun *et al.* (2016) also mentioned the issue of corruption, however, failed to find a definite answer as there is also a possibility of an opposite effect since a corrupt system might produce a lower number of STRs due to impaired reporting.

Additionally, with the expansion of information technologies, a highly interconnected economic environment that frequently crosses international borders,

[9]Braun *et al.* (2016) in their research proxied criminal activities of terrorism and organized crime with cost for businesses caused by terrorism obtained form the World Economic Forum: Global Competitiveness Index, and cost for businesses caused by organized crime obtained from the World Economic Forum, respectively.

[10]Braun *et al.* (2016) in their research proxied corruption with the Freedom from Corruption Index obtained from the Heritage Foundation.

which might allow for new types of criminality, was created (Eurasian Group 2014). There has been recognized a significant rise in cybercrime since the beginning if the 21st century, also concerning the financial sphere[11]. However, despite a strong theoretical ground, Reganati & Oliva (2018) did not find this variable statistically significant.

Moreover, the FATF in the interpretative note to FATF Recommendation 3 suggests to all compliant countries to include a range of offences from the designated categories of offences. The full list of the FATF-recognized and the EU-recognized predicate offences is included in Appendix A, Table A.1.

2.2.2 Enforcement Factors

It has been proven that countries with high institutional capability, efficient governance systems, and effective legal and regulatory environments exhibit lower levels of money laundering (Vaithilingam & Nair 2007; Puffer *et al.* 2016). Also Braun *et al.* (2016) reached the same result and concluded that the effectiveness of STR systems is supported by established institutional and legal frameworks. Legal studies show that the number of STRs tends to increase when the range of predicate offenses under national criminal law is expanded, and when there is a penalty applied for failing to uphold reporting responsibilities under national AML/CFT laws.

Another important factor, according to Braun *et al.* (2016), when exploring the levels of suspicious transactions, should be mutual evaluations conducted by the FATF as they can lead to a temporary increase in STRs. Specifically, the number of STRs may rise as a result of bilateral assessments of states' AML/CFT frameworks. There may be some initial over-reporting, but this should decrease as the STR system becomes more effidient and reporting entities receive proper training. According to Braun *et al.*'s model, there is predicted of about a 25% increase in STRs in the year following the MER publication, and approximately a 33% increase in the subsequent year, compared to what the country would have experienced without an on-site visit and publication of a MER. Although the effect decreases in the third year, it still results in a 20% increase. According to Braun *et al.* (2016) this suggests that representatives of local AML/CFT

[11]Reganati & Oliva (2018) then elaborate that, for example, electronic payment systems have several unique characteristics that increase the risk of money laundering. The quick processing of transactions, particularly cross-border money transfers, and the low associated costs make money laundering services more affordable and consequently make various money laundering techniques easier.

programs[12] respond strongly to the FATF evaluations and increase their efforts to report more STRs. Additionally, the increase is not a persistent trend and tends to decrease after the second year.

In accordance with the FATF Recommendation 9 regarding bank and professional secrecy provisions implemented within local legislation, Braun *et al.* (2016) also suggested a negative relationship between the presence of these laws and the levels of suspicious transactions. Since the publishing of Braun *et al.*'s article, many of these laws have been lifted or relaxed due to regulatory pressure from the Group of Twenty (G20), the FATF, and the Organisation for Economic Co-operation and Development (OECD). The majority of FATF-recognized jurisdictions are now at least partially compliant (PC) with the FATF Recommendation in question.

On the contrary, Reganati & Oliva (2018) expressed the opinion that in their research only very high levels of enforcement efforts could visibly reduce money laundering.

2.2.3 Macroeconomic Factors

The impact of different macroeconomic factors on reporting levels should also be considered to facilitate comparisons of AML/CFT programs implemented across nations.

Braun *et al.* (2016) highlighted the economic size of a country measured in GDP *per capita* as a likely determinant of the numbers of STRs between countries. A larger financial sector, as measured in GDP *per capita*, may lead to more STRs. Additionally, the size of the shadow economy is likely to affect the number of suspicious transactions as it combines the institutional strength of a country with the economic well-being of its inhabitants and their motivation to seek income outside the monitored financial sector (Schneider 2021).

[12] Depending on the jurisdiction and local institutional structure, a representative of the AML/CFT program is either the local FIU or the local central bank.

Chapter 3

Research Considerations and Hypotheses

This chapter aims to discuss the potential impact of the COVID-19 pandemic on the drivers of STR levels outlined in Chapter 2: Literature Review, Section 3.1 takes into account the unique circumstances that have emerged with the outbreak of COVID-19. Section 3.2 highlights the contribution of this thesis, while Section 3.3 presents a comprehensive set of hypotheses for the upcoming econometric analysis.

3.1 Effects of COVID-19

A major difference between the analysis in this thesis and the research presented above is considering the impact of the global COVID-19 pandemic. In March 2020, the World Health Organization declared the outbreak of COVID-19 to be a global pandemic, ushering in an era of profound effects on human lives worldwide.

The unprecedented crisis caused by COVID-19 has affected all aspects of society and likely resulted in changes in behavior of individuals, companies, and governments. These changes have given criminals new opportunities to commit crimes and launder their proceeds (Patel 2023).

This section describes several changes in predicate offenses and enforcement measures, and suggests the possible effects the pandemic might have had on activities related to money laundering and financing of terrorism.

3.1.1 Effects on Crime-Related Factors

While it is difficult to definitively state whether the pandemic has led to a net increase in criminal behavior, many regions have reported significant surges in certain types of cases, and therefore the general trend suggests that criminals actively exploited the opportunities created by the pandemic across the globe (FATF 2020)[1]. While certain groups of crime such as traditional theft saw a downturn due to lockdowns, other types of crime, for instance fraud and cybercime, were on the rise since the pandemic broke out.

During the pandemic, according to Al-Qahtani & Cresci (2022), there was a rise in COVID-19-related scams and fraudulent activities, such as fake cures, charity solicitations, and scams related to stimulus checks. The situation with COVID-19-related scams even reached the severity to be nicknamed the "COVID-19 scamdemic" (Al-Qahtani & Cresci 2022).
Expanded stimulus programs created opportunities for criminals to deceitfully claim funds from governments. Investment fraud involving the promotion of companies developing vaccines and treatments for COVID-19 also occurred, with criminals misleading victims with guarantees of exponential returns on investment. Fraudulent fundraising for fake charities also expanded, with scammers misrepresenting themselves and requesting funds from potential donors, sometimes posing as representatives of recognized charities or creating fictitious charitable organizations (Al-Qahtani & Cresci 2022).

As the social and economic landscape changed rapidly, cyber threats also evolved, causing widespread global harm. Criminals in their quest for alternative revenue sources were expected to increase their engagement in cybercrime, exploiting the digital components inherent in various types of other crimes such as payment scams, online scams targeting health procurement authorities, or cyber attacks on infrastructure related to pandemic mitigation (UNODC 2020b). This interest in cybercrime was expected to be further fueled by the existence of the underground market which provides 'cybercrime-as-a-service'. This market is enticing to criminals due to its ease of access, low operating costs, and the potential for substantial returns (INTERPOL 2020). Since the impacts of the COVID-19 pandemic are yet to be fully evaluated, it is difficult to say with certainty whether the predictions came true. Those

[1]The FATF (2020) Updated Report on COVID-19-Related Money Laundering and Terrorist Financing Risks and Policy Responses was published in December 2020. While there certainly was not enough time to derive far-reaching implications arising from the COVID-19 pandemic, certain general trends could already be concluded.

predictions, however, can also be discussed during the descriptive process of the collected data.

In May 2020, in the wake of the pandemic, the UNODC (2020a) published a research brief titled COVID-19 and the Drug Supply Chain: From Production and Trafficking to Use, which made predictions about the development of the market for narcotic and psychotropic substances. The Research and Trend Analysis Branch of the United Nations Office on Drugs and Crime (UNODC) and the UNODC Global Research Network raised concerns that COVID-19 measures may inadvertently benefit drug traffickers as countries with limited law enforcement capacity may divert resources away from counter-narcotics efforts to enforce COVID-19 prevention measures. However, after the introduction of strict movement restrictions and lockdowns in many countries around the globe, the UNODC warned that actors in the drug supply chain would likely stockpile drugs. This could lead to a short-term decline in money laundering activity related to drug distribution. Whether the predictions came true is difficult to asses since the impacts of the COVID-19 pandemic are still under evaluation.

COVID-19 was predicted to have widespread effects on regular and irregular migration, with unique impacts in different regions depending on government measures to contain the pandemic. The UNODC (2020c) report on COVID-19-related migrant smuggling notes that for those fleeing from conflict and persecution, COVID-19-related restrictions could have different impacts on migrant smuggling compared to other types of migration. Border closures may have even increased the need for smuggler services, with smugglers potentially raising prices to take advantage of increased demand. The global economic downturn, unemployment, and intensified migration restrictions could all contribute to increased demand for smuggling services and the risks of trafficking. While the short-term effects of COVID-19 and the economic crisis may curb irregular migratory movement, unequal economic recovery in the long term could lead to more smuggling of migrants toward countries experiencing a quicker recovery (UNODC 2020c). Whether these predictions will come true is yet to be evaluated.

3.1.2 Effects on Enforcement Factors

The global pandemic of COVID-19 caused an economic recession in majority of the OECD countries (Schneider 2021). As a result, GDP and national income

declined, while unemployment increased, giving people incentives to seek activities in the shadow economy to earn extra "black" income. Schneider (2021) in his review article Development of the Shadow Economy of 36 OECD Countries over 2003-2021: Due to the Corona Pandemic a Strong Increase in 2020 and a Modest Decline in 2021 reported an increase in the size of the shadow economy in every OECD country since the COVID-19 pandemic started. The author also noted that the future decrease in the size of the shadow economy is going to be stronger in countries with lower corruption and firmer governance in place.

During the COVID-19 pandemic, national governments prioritized addressing immediate healthcare concerns such as overloaded medical facilities, stay-at-home orders, and aiding businesses and individuals suffering from sudden unemployment. This sometimes limited their capacity to provide updates on their progress in implementing AML/CFT measures and conducting thorough investigations and analyses.

From the FATF (2020) Update on COVID-19-Related Money Laundering and Terrorist Financing Risks and Policy Responses follows that for those reasons the FATF has extended reporting deadlines for monitored jurisdictions and given the option to skip a round of progress reporting altogether. The organization has also temporarily suspended the evaluation process for countries on the High-Risk Jurisdictions list subject to a Call for Action[2].

Similarly, not to compromise the integrity of mutual evaluations, the FATF temporarily suspended its assessment program and subsequently delayed numerous mutual evaluations since the COVID-19-related obstructions such as lockdowns, quarantines, and travel bans also prevented the stakeholders to fully engage in the evaluation process. Furthermore the report notes that training activities organized by the FATF had to be moved to the online sphere. Conversely, launching the @cademy, FATF's learning platform, was a successful step towards delivering modified versions of the FATF's courses.

Due to these limitations, the effects of evaluation activities during the analyzed period may be significantly reduced compared to the outcomes of Braun *et al.* (2016).

[2]For the definition of "High-risk jurisdictions subject to a Call for Action" and "other monitored jurisdictions", please refer to Appendix A, Section A.1.

3.1.3 Effects on Money Laundering and Terrorist Financing Risks

The Updated FATF (2020) Report on COVID-19-Related Money Laundering and Terrorist Financing Risks and Policy Responses essentially identified two areas in direct relation to money laundering risks. One of them being the change in financial behaviors and the other being risks caused by heightened financial volatility related to the disease outbreak.

Changes in client behavior made it difficult for financial institutions to identify irregularities. For example, such change in financial habits can be caused by the transition to remote working and consequently to remote payments. In certain countries where digital transactions and services were not widely adopted, reporting entities were unprepared to handle transactions or provide services remotely. This increased the difficulty of performing effective customer due diligence or continuous monitoring (FATF 2020).

FATF (2020) in the same report then noted that many jurisdictions experienced economic downturns, which gave room to numerous money laundering vulnerabilities. One such risk is the potential for illicit funds to capitalize on businesses in distress or those experiencing swift changes in demand, either through capital infusion or acquisition. The report then notes that industries that were particularly susceptible include real estate, construction, industrial cleaning, transportation, and small to medium enterprises in general. At the same time, economic worries have led to an increase in cash withdrawals, resulting in a growing volume of cash in circulation.

The same report also notes that while many jurisdictions did not observe a change in terrorist financing risks due to the pandemic, some mentioned potential future vulnerabilities. These are related to the abuse of non-profit organizations and emerging opportunities within the predicate threat landscape.

3.2 Contribution of This Thesis

The authors of the literature used in this thesis identified several limitations while conducting their research. For instance, significant inconsistencies were caused by diverse legislative structures among the analyzed countries, and a lack of data reporting on indicators such as predicate offences. As a result, the authors often had insufficient observations to test their hypotheses and needed to use various proxy variables that might significantly deviate from

the original variables under investigation[3].

Moreover, no comprehensive research has been conducted on the EU as a geographic entity, despite it representing a unique political arrangement. Although the EU Member States have their own legislation and have the freedom of implementing the EU legislation with exceptions in regard to their unique situation, their legal systems could be more similar than the systems of countries with significantly different culture and economic development. For this reason, deriving results from an empirical analysis conducted on the European Union could bring a better comparability across variables.

In recent years, in light of the global COVID-19 pandemic, the world has faced a unique economic and social situation that has also brought significant changes to the way regulations and evaluations have been carried out and assessed, compared to previous research.

This thesis aims to investigate potential drivers of STR levels, which are precursors to being recognized as money laundering offences. The investigation will make use of the unique situation and complex geographic set described above, and will consider crime-specific, enforcement, and macroeconomic factors described in the preceding chapters.

3.3 Hypothesis Development

The initial idea behind this research was to explore the factors that drive levels of money laundering. Suspicious Transaction Reports, which serve as precursors for recording money laundering offences, provide the best temporal comparability with other reported offences. Therefore, the number of STRs was set as a dependent variable in the model, as in the research conducted by Braun *et al.* (2016), and the numbers of reported predicate offences as well as other meaningful variables are set as regressors.

It was assumed that the more predicate offenses committed within a country, the more illicit revenue is generated, and thus the need for money laundering is higher. With more illegitimate proceeds to be laundered, the chance of

[3]For instance, Braun *et al.* (2016) used proxy variables in their research for criminal activities of terrorism and organized crime obtained from the World Economic Forum. These variables were based on the cost for businesses caused by terrorism and the cost for businesses caused by organized crime, respectively, and were measured on a scale from 1 to 7 according to an answer to a survey question: In your country, to what extent does the threat of terrorism/ organized crime impose costs on businesses? [1 = to a great extent; 7 = not at all]. Although no better data was probably available, the accuracy of those variables might be limited.

registering such attempts increases, and therefore, more Suspicious Transaction Reports should be generated.

Therefore, the following research questions were formulated to assess whether a framework with this setting can uncover potential streams of laundered money and what the most prominent streams might be.

1. What were the drivers of STR levels in the EU between 2016 and 2021?
2. Was the list of predicate offences efficient in uncovering the sources of illicit gains in the EU between 2016 and 2021?

Considering the conclusions of the authors mentioned in Chapter 2 and the absence of similar research being conducted on the EU Member States as a geographic set or in the time frame including the COVID-19 pandemic, a comprehensive set of hypotheses has been developed to be tested empirically.

This section provides a detailed overview of the hypotheses tested in the subsequent analysis and provides an explanation of their formulation.

Hypothesis 1 Corruption affects STR levels (direction unclear).

Corruption crimes are often committed with the aim of generating private profits that need to be laundered in order to appear legitimate and be consumed without fear of confiscation (Reganati & Oliva 2018). On the other hand, while corruption yields substantial profits that need to be laundered and might trigger STRs, Braun *et al.* (2016) argues that a corrupt system might be prone to under-reporting if it serves certain interests.

Hypothesis 2 Fraud affects STR levels (direction unclear).

On a similar note to corruption, fraud also generates substantial illegal revenues that would require laundering in order to be enjoyed. However, the direction of the effect cannot be easily anticipated since the class of fraudulent behaviour is broad and the nature of fraud constantly changes, which might be difficult for reporting entities to record.

Hypothesis 3 Drug trafficking increases STR levels.

Drug trafficking, as one of predicate offences defined by the FATF and also recognized by the EU, is a part of one of the largest illegal markets. Therefore this felony is expected to be a noticeable driver of STR levels. However, in light of the COVID-19 pandemic and the predictions brought by UNODC (2020a), there might also occur a short-term decrease in suspicious transaction reporting related to drug-related offences.

Hypothesis 4 Institutional strength increases STR levels.

Braun *et al.* (2016) proposed that "well-established legal and institutional structures promote the effectiveness of STR systems." This belief is based on the idea that factors such as the government stability and capacity to combat corruption, and the size of the shadow economy significantly influence reporting levels. This is also backed by the findings of Reganati & Oliva (2018) and Vaithilingam & Nair (2007).

In this analysis, the institutional strength is going to be proxied by the size of the shadow economy in terms of GDP and the Fragile States Index. Further information on selected variables is provided in Chapter 4: Data, Section 4.1.

Hypothesis 5 The COVID-19 pandemic affected STR levels (direction unclear).

The global COVID-19 pandemic has caused numerous complications in the AML/CFT front line. As a result, several mutual evaluations and trainings have been postponed, governmental capacities have been stretched beyond expectations, and reporting entities have experienced changes in financial behaviors and cash withdrawals. These factors can lead to either overlooking potentially suspicious transactions or over-reporting suspicious-looking transaction irregularities.

Hypothesis 6 Mutual evaluations and follow-ups increase STR levels.

Braun *et al.* (2016) concluded that on-site visits and mutual evaluations increase STR levels by facilitating and supervising the implementation of the FATF Standard. Improvements that occur between MER rounds, after compliance reassessments based on follow-up reports, should also be taken into consideration. However, it is necessary to re-test this conclusion with the present set of countries since the process of obtaining a FATF Rating as well as the legislative process behind addopting a new piece of legislation seem rather lengthy to show effect in a span of 3 years, or a single year as suggested by Braun *et al.*.

Chapter 4

Data

This chapter provides a comprehensive guide to the dataset used in the subsequent analysis. It details the journey from initial collection to selection of variables for developing the econometric model. The aim is to offer transparency and provide reasoning behind employed techniques, thereby fostering better understanding of the methodological approach.

Section 4.1 begins with a description of how the data was collected from different sources. To ensure compatibility across variables, the International Classification of Crime for Statistical Purposes (ICCS) system was employed[1]. An overview of the variables included in the dataset, along with their definitions, is presented in Table 4.1. Section 4.2 then proceeds to provide descriptive statistics that offer preliminary insights into the data and illustrate possible outcomes of some of the predictions stated in Chapter 3, Section 3.1. Moving forward, Section 4.3 explains how the variables used in the model were selected based on a strict set of criteria to build the best set for the final estimation.

4.1 Data Sources and Variable Description

This thesis aims to shed light on the factors that potentially drive levels of suspicious transactions. As highlighted in Chapter 2: Literature Review, there are several predicate offences to money laundering and terrorist financing that have empirically proven effects on these levels, such as bribery and corruption. As listed in Appendix A: Theoretical Background, the FATF and later the EU have presented a list of total of 21 FATF-recognized, and 22 EU-recognized

[1]For further information, please refer to UNODC (2015).

predicate offences[2]. These offences, along with other macroeconomic and enforcement indicators, were considered as a basis for the following data collection. Due to limited data availability, however, some potential variables were excluded[3] from the dataset.

Among other discrepancies, the inconsistency in legislation, recording methods, and public reporting habits across individual EU Member States also pose a risk to the consistency and comparability of the data. For these reasons, the accuracy of this analysis may be affected from the outset, despite various measures taken to mitigate these effects.

Three measures were taken to maintain the best comparability. First, the criminal data featured in this thesis is extracted from officially recorded crime statistics that capture criminal acts documented by police across the European Union from 2016 to 2021. Second, the categorization of crimes through the dataset development aligns with the ICCS system. Therefore, a strict criteria for selecting data from different sources is implemented based on their international definition, rather than inconsistent local definition[4]. Lastly, to maintain the most accurate temporal comparability, reported offences and recorded suspicious transactions were selected in the dataset, as there might be significant delay and temporal mismatch if different specifications were considered [5].

This next part of this section aims to describe the sources of the individual variables and provides further insight into the process of variable development after addressing the issues listed above.

[2]For the full list of the predicate offences as defined by the EU and therefore concerning the geographic and political set of countries in this thesis, please refer to Table A.1.

[3]Although the following offences are considered as predicate to money laundering and financing of terrorism by the FATF and the EU, they were not included in the dataset due to data unavailability from the EU Member States: participation in an organized criminal group and racketeering, illicit arms trafficking, illicit trafficking in stolen goods and other goods, counterfeiting of currency, counterfeiting and piracy of products, smuggling, tax crimes relating to direct and indirect taxes, extortion, forgery, piracy, and insider trading and market manipulation.

[4]For instance, Eurostat databases in their methodology already include specific ICCS codes to disclose how the data was counted (Eurostat 2023c)

[5]For instance, when a suspicious transaction report is delivered to the respective FIU, the report analysis begins. Afterwards, the report might be handed over to the executive authorities, and a money laundering offence might be reported. The authorities then initiate an investigation, which may or may not be resolved in the future. This process can take several years to complete. Similarly, when an offence is committed, it is reported to the police, and the relevant authorities begin their investigation. This investigation may also last for several years. Therefore, only the initial stages were considered when collecting the dataset. On the other hand, if different instances were considered, the explanatory variables could easily be mismatched with each other or with the explained variable on the time level.

Suspicious Transaction Reports The number of Suspicious Transaction Reports, submitted to a FIU by local obliged entities were obtained from the annual reports of the respective FIUs, which are available on their websites or on the website of the local Ministry of Finance. Alternatively, the information was extracted from Mutual Evaluation Reports available on the FATF website[6] for the relevant country. A complete list of the Financial Intelligence Units in the European Union is available on the Egmont Group of Financial Intelligence Units website[7].

Terrorism The numbers of reported acts of terrorism were obtained from the annual EU Terrorism Situation and Trend (TE-SAT) reports, which are publicly available on the European Union Agency for Law Enforcement Cooperation (EUROPOL) website[8]. These reports collect, among other information, the numbers of completed, foiled, and failed terrorist attacks and suspicions of terrorism in EU Member States each year.

Trafficking in Human Beings and Migrant Smuggling Due to limited data availability, this research deviated from the official definition of "human trafficking and migrant smuggling", and considered only trafficking in human beings. The number of reported offences of trafficking in human beings was obtained from the Eurostat crim_thb database. This database is publicly available as part of the Crime and Criminal Justice database[9]. In cases where data points were missing[10], acts from ICCS section 0204 were used instead, as suggested by the database metadata[11]. This group involves trafficking of adults and child trafficking.

Sexual Exploitation Due to limited data availability, this research deviated from the official definition of "sexual exploitation" and considered all crimes of sexual violence since sexual exploitation is included in this group in the available database. The number of reported offences of sexual violence was

[6]For further information, please refer to FATF (2023b).

[7]For further information, please refer to Egmont Group of Financial Intelligence Units (2023a).

[8]For further information, please refer to EUROPOL (2017), EUROPOL (2018), EUROPOL (2019), EUROPOL (2020), EUROPOL (2021), and EUROPOL (2022).

[9]For further information, please refer to Eurostat (2023a).

[10]For instance, in case of Estonia, the missing data points were filled using reports obtained from the Statistical Database of the Estonian Statistical Office, Statistics Estonia.

[11]For further information, please refer to Eurostat (2023d).

obtained from the Eurostat crim_off_cat database, which is publicly available as part of the Crime and Criminal Justice database. As suggested by the database metadata[12], the database registers acts from ICCS section 0301 and ICCS section 0302.

Illicit Trafficking in Narcotic Drugs and Psychotropic Substances Due to limited data availability, this research deviated from the official definition of "illicit trafficking in narcotic drugs and psychotropic substances", and instead considered all offences in section 0601 of the ICCS system, as suggested by the database metadata. This group includes all unlawful acts involving controlled drugs or precursors. The number of unlawful acts involving controlled drugs or precursors was obtained from the Eurostat crim_off_cat database, which is publicly available as part of the Crime and Criminal Justice database.

Corruption The number of reported acts of corruption was obtained from the Eurostat crim_off_cat database, which is publicly available as part of the Crime and Criminal Justice database. The database registers acts from ICCS section 0703, which also includes the act of bribery, as suggested by the database metadata. The same methodology was followed in case of extraction of missing data points from alternative sources[13].

Fraud The Eurostat crim_off_cat database, which is part of the Crime and Criminal Justice database, was used to obtain the number of reported acts of fraud. The database registers acts from ICCS section 0701. If data points were missing, the same methodology was followed to extract them from alternative sources[14].

Environmental Crime The numbers of reported acts of environmental crime were obtained from the dataUNODC database, publicly available on the UNODC website[15] under the section "Corruption & Economic Crime." The database includes counts of various types of environmental crime, such as acts involving the movement or dumping of waste, acts that cause environmental pollution

[12]For further information, please refer to Eurostat (2023c).

[13]For instance, in the case of Greece, missing data points were filled using reports obtained from the Hellenic Statistical Authority.

[14]For instance, in the case of the Netherlands, missing data points were filled using information from the annual Safety Monitor published by the Dutch Statistical Office, Centraal Bureau voor de Statistiek.

[15]For further information, please refer to UNODC (2023a).

or degradation, acts that result in the depletion or degradation of natural resources, and trade or possession of protected or prohibited species of fauna and flora.

Murder and Grievous Bodily Injury The Eurostat crim_off_cat database, which is publicly available as part of the Crime and Criminal Justice database, was used to obtain the number of reported acts of murder and grievous bodily injury. The database records acts from ICCS section 0101 (intentional homicide), ICCS section 0102 (attempted intentional homicide), and ICCS section 020111 (serious assault), as indicated by the database metadata.

Kidnapping, Illegal Restraint and Hostage-Taking Due to limited data availability, this research deviated from the official definition of "kidnapping, illegal restraint and hostage-taking," and considered only kidnapping. The numbers of reported acts of kidnapping were obtained from the dataUNODC database, publicly available on the UNODC website[16] under the section "Violent & Sexual Crime."

Robbery and Theft The Eurostat crim_off_cat database provided the number of reported acts of robbery and theft. This database is publicly available as part of the Crime and Criminal Justice database. It registers acts from ICCS section 0401 (robbery), and ICCS section 0502 (theft), which also includes theft of a motorized land vehicle or parts thereof, as suggested by the database metadata.

Cybercrime The number of reported acts of cybercrime was obtained from the dataUNODC database, which is publicly available on the UNODC website[17] under the section "Corruption & Economic Crime." The database includes counts of various types of cybercrime, such as unlawful access to a computer system, unlawful interception or access of computer data, and unlawful interference with a computer system or computer data. The same definitions were used when obtaining missing data points from alternative sources[18].

[16]For further information, please refer to UNODC (2023d).
[17]For further information, please refer to UNODC (2023a).
[18]For instance, in the case of the Czech Republic, missing data points were filled using annual Statistics of Criminality issued by the Police of the Czech Republic.

Fragile States Index The Fragile States Index (FSI) annually ranks 179 countries based on a variety of stressors that affect their fragility. This index uses the Conflict Assessment System Tool (CAST) designed by the Fund for Peace, a unique analytical technique. The Fund for Peace (FFP) aims to prevent violence and promote lasting security worldwide by fostering connections and trust across sectors.

The purpose of the Fragile States Index is to serve as a proxy for the institutional strength and enforcement capacity of individual countries. The index was chosen as a suitable proxy, as it is based on several indicators, including security apparatus, economic decline, uneven economic development, human flight and brain drain, state legitimacy, and human rights and rule of law. The index technically ranges from zero to infinity, and a lower score indicates a less fragile country[19]. Scores of the FSI for the respective year were obtained from the official website of the FFP[20].

Enforcement The variable enforcement, in the form of a dummy variable, documents the years in which a mutual evaluation or a follow-up technical re-rating took place in a country. Lagged forms of this variable up to time *t+3* are also included to account for the delay between the discovery of a system deficiency and the implementation of an improvement[21]. Data for this variable were obtained from FATF pages of the respective countries[22].

GDP per Capita Data for GDP per capita were obtained from the Eurostat nama_10_pc dataset, which is publicly available as a part of the Economy and Finance database[23]. This variable is recorded annually in current prices as Euro per capita.

The purpose of this variable was to test the claim of Braun *et al.* (2016) whether economic size of a country is a determinant of STR levels, as suggested by Braun *et al.* (2016), since a larger economic size of a country might indicate

[19]In the 2023 edition of the index, the most sustainable country, Norway, scored as low as 14.5 while the least stable country, Somalia, scored 111.9.

[20]For further information, please refer to Fund for Peace (2023).

[21]There are several gaps in this variable and its lags since some countries, partially due to the global pandemic of COVID-19, have intervals between their mutual evaluations as wide as 14 years with no follow-up re-evaluations. This is the case, for instance, of Bulgaria, Croatia, Estonia, Poland, and Romania.

[22]For further information, please refer to FATF (2023b).

[23]For further information, please refer to Eurostat (2023b).

more financial transactions, suggesting a higher chance of reporting a suspicious transaction.

Size of the Shadow Economy The size of the shadow economy is measured as a percentage of the official GDP of the respective country. The size of the shadow economy is calculated using the Multiple Indicators and Multiple Causes (MIMIC) estimation method to obtain relative values, the currency demand approach and the income discrepancy method are then used to calibrate the MIMIC values to obtain absolute results. The data for the size of the shadow economy in OECD countries was obtained from the work of Schneider (2021).

The purpose of this variable, together with the variable containing the Fragile States Index, was to proxy the institutional strength and trustworthiness of a country.

Global Pandemic of COVID-19 The pandemic of COVID-19 is represented by a dummy variable that indicates the years classified as a global pandemic by the World Health Organization (WHO)[24].

[24]The World Health Organization considers the outbreak of COVID-19 a global pandemic since March 2020 (FATF 2020) and officially declared its end in July 2023 (WHO 2023).

Table 4.1: Variable Definitions

variable	description	unit	ICCS
STR	Suspicious transaction reports delivered to the respective FIU by the local obliged entities	Annual absolute number	
terr	Completed, foiled, and failed terrorist attacks and suspicions of terrorism	Annual absolute number	0906
traff	Reported offences of trafficking in human beings	Annual absolute number	0204
sex	Reported offences of sexual violence	Annual absolute number	0301, 0302
narc	Reported unlawful acts involving controlled drugs or precursors	Annual absolute number	0601
cor	Reported acts of corruption, incl. bribery	Annual absolute number	0703
fraud	Reported offences of fraud	Annual absolute number	0701
murd	Recorded acts of murder and grievous bodily injury	Annual absolute number	0101, 0102, 020111
kidn	Recorded acts of kidnapping	Annual absolute number	020221
theft	Recorded offences of robbery and theft	Annual absolute number	0401, 0502
envir	Reported offences of environmental crime	Annual absolute number	10
cyber	Reported acts of cybercrime	Annual absolute number	09031, 09032, 09033
frag	Fragile States Index score; the higher the score, the more fragile	Annual unit-less score	
enf0, enf1, enf2, enf3	Variable indicating whether a mutual evaluation or follow-up technical re-rating took place in the country and year	Dummy variable	
gdp.pc	GDP per capita	Euro per capita, current prices	
shad	Size of the shadow economy	Percentage of GDP	
pand	Variable describing the global trend of the COVID-19 pandemic	Dummy variable	

4.2 Descriptive Statistics

This section analyzes the current dataset by examining temporal trends and comparing them with theoretical expectations and existing research findings.

A balanced dataset was compiled using the matching techniques described in Section 4.1. The dataset includes annual observations from 27 EU Member States between 2016 and 2021, and it contains 162 observations of 22 variables. For additional information on common descriptive statistics of all variables, please refer to Appendix B, Table B.1.

The following section aims to examine the trends described in the underlying literature. In line with the findings of Braun *et al.* (2016), reporting levels vary significantly between countries, with Finland (2020) reporting only 174 STRs and Germany (2021) reporting 298,507 STRs. Over the analyzed period from 2016 to 2021, the three countries with the highest number of reported STRs are Germany (770,119), Italy (651,313), and France (593,004), while the lowest levels come from Slovenia (4,664), Lithuania (5,380), and Croatia (7,292). Figure 4.1 displays the reporting levels in each country summed over the analyzed period from 2016 to 2021.

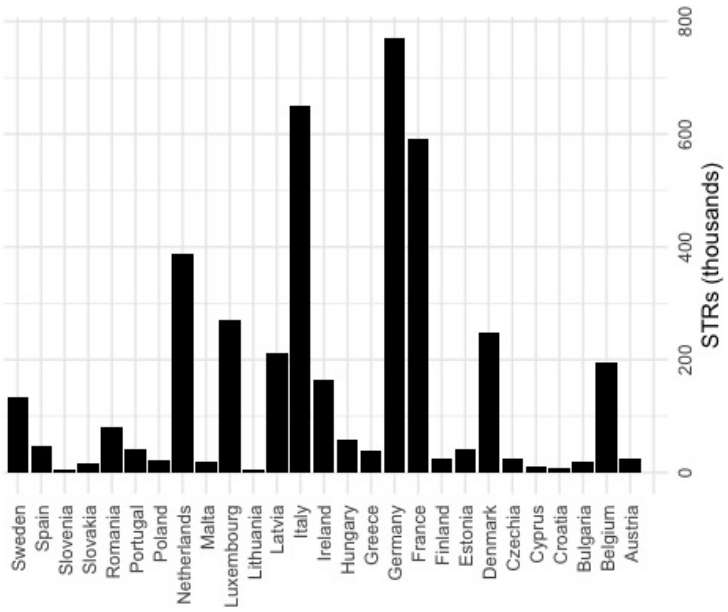

Figure 4.1: Sum of STRs (th.) Reported by Country 2016-2021

Figure 4.2 captures the escalating trend in the total count of STRs (in thousands) throughout the time frame under consideration. It is evident from the graph that there has been a near-exponential surge in the count of STRs from around 444,000 instances in 2016 to over 1.1 million by 2021.

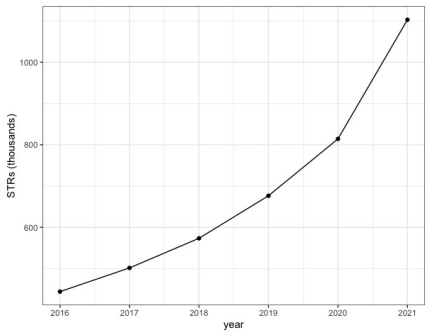

Figure 4.2: Sum of STRs (th.) Reported in the EU 2016-2021

Unlike Braun *et al.* (2016), who observed a significant positive trend between GDP *per capita* and reported suspicious transactions, a simple scatterplot constructed on the present dataset did not show a visually distinguishable trend until after controlling for outliers[25]. However, as shown in Figure 4.3, there does appear to be a positive relationship. The theory behind this link is that the larger the size of the financial sector (measured in GDP *per capita*), the more transactions and consequently more STRs.

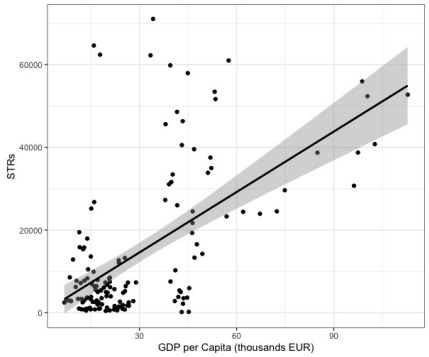

Figure 4.3: Number of STRs Against GDP *per capita* (th. EUR)

[25]Outliers were identified using the quantile method and were the following: 79376 (France, 2018), 99527 (France, 2019), 115601 (France, 2020), 165171 (France, 2021), 77252 (Germany, 2018), 144914 (Germany, 2019), 144004 (Germany, 2020), 298507 (Germany, 2021), 101000 (Italy, 2016), 94000 (Italy, 2017), 98000 (Italy, 2018), 105789 (Italy, 2019), 113000 (Italy, 2020), 139524 (Italy, 2021), 103947 (Netherlands, 2020), and 96676 (Netherlands, 2021).

Finally, Becker (1968) stated that there is going to be a positive temporal trend in the absolute number of felonies committed. However, the present dataset shows the opposite trend with a sharp decline in the total number of reported crimes over the analyzed period from 2016 to 2021 (Figure 4.4). This trend may be due to a change in the type of felonies committed as a result of the global COVID-19 pandemic. Since the crime-specific section of the dataset is based on the EU-recognized list of predicate offences, it may not accurately reflect the newly emerged situation and affirm the otherwise valid conclusion of Becker. With strict COVID-19 measures in place, certain types of criminal activity, such as traditional theft, declined, as shown by Figure 4.5. However, organizations like the FATF and the UNODC predicted an increase in fraudulent activities and cybercrime, which is confirmed by the present dataset as depicted by Figure 4.6 and Figure 4.7.

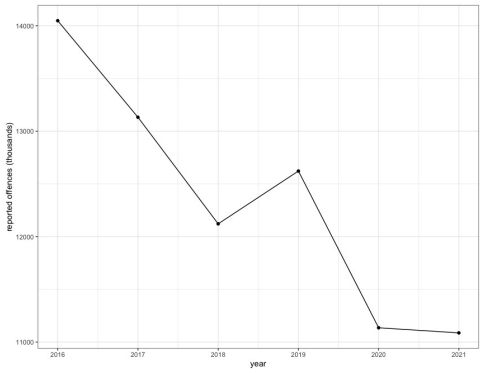

Figure 4.4: Reported Offences 2016-2021

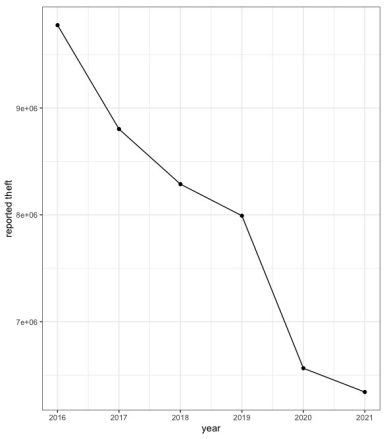

Figure 4.5: Reported Thefts 2016-2021

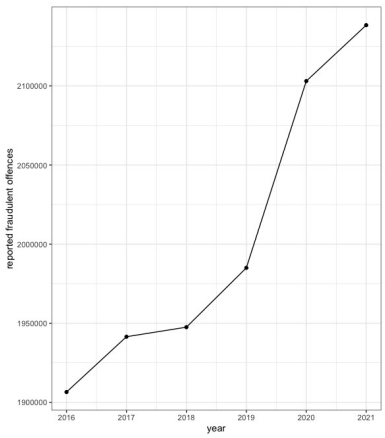

Figure 4.6: Reported Frauds 2016-2021

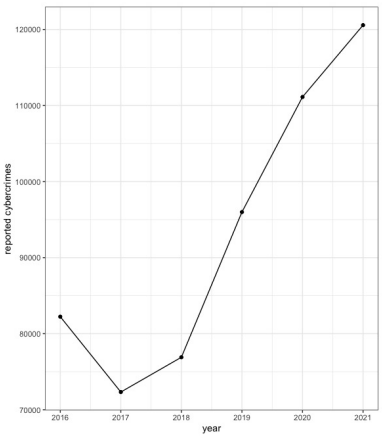

Figure 4.7: Reported Cybercrimes 2016-2021

4.3 Variable Selection

The initial phase of variable selection involved identifying those that should be included based on findings from previous research mentioned in the literature review, while being constrained by data availability. After a balanced dataset was established, further diagnostics were performed to select the most appropriate variables to develop and estimate the model.

Following the initial data collection, a correlation matrix was generated using each variable from the dataset. By examining bivariate correlations, highly correlated variables were identified and deemed unsuitable for simultaneous use in the final model. To avoid multicollinearity, a critical threshold of |0.8| was set for the value of the correlation coefficient. The chosen value of |0.8| is based on Mukaka (2012), who considers the absolute value of the correlation coefficient between 0.8 and 1 to signify a "very strong" correlation. Table B.2 shows the correlation matrix for the remaining variables after controlling for multicollinearity. This procedure resulted in discarding the following variables: sexual offences, kidnapping, murder and grievous injury, and environmental crime.

Next, the coefficients of variation for each variable were calculated. The coefficient of variation is defined as the ratio of a variable's standard deviation to its mean, as outlined by Sorensen (2002). The formula for the coefficient of variation is as follows:

$$CV = \frac{s}{\overline{x}} \tag{4.1}$$

$$s = \sqrt{\frac{\sum_i^n \left(x_i - \overline{x}\right)^2}{n-1}}, \overline{x} = \frac{\sum_i^n x_i}{n} \tag{4.2}$$

The coefficient of variation is a dimensionless measure of relative variability, which allows for comparison of derived values. Variables with a coefficient of variation less than |0.1| should be excluded from the model. This threshold is based on the assumption that if the standard deviation (the numerator of the coefficient of variation) is only 10% of the mean (the denominator of the coefficient of variation), then there is relatively little dispersion in the data. However, it was discovered that none of the present variables exhibited such a low coefficient of variation, and therefore no variables were discarded. Table B.1 shows the coefficient of variation for every variable.

Finally, the Augmented Dickey-Fuller test confirmed stationarity in all variables and rejected the presence of unit roots.

Chapter 5

Methodology

This chapter outlines the methodology used to estimate the final model. Various techniques were employed to classify the most appropriate variables that explain the drivers of STR levels. Additionally, tests were conducted to identify the most suitable type of model estimation, and the final model assumptions were examined. Further information on the tests used and their results is provided in Section 5.1.

The data analysed in this thesis includes both cross-sectional and time dimensions. To accurately answer the presented research questions, the study makes use of panel data structure, also known as longitudinal data. Moreover, the logic behind the underlying data suggests the presence of both time-invariant and entity-invariant effects such as legislation effects in the former category and global financial and epidemiological trends in the latter.

Therefore, it would be reasonable to use the two-way (also known as "twoways") fixed effects model, which involves a distinct intercept for each location and time period. However, after conducting an F-test for two-way effects, there was not enough evidence to reject the null hypothesis for one-way fixed effects and therefore, one-way fixed effects estimation method was deemed the most appropriate. The F-test for two-way effects was also performed between the two models after the final selection of variables, with the same outcome and even higher p-value.

The choice of the most suitable estimation method is underlaid with the Fisher (F) test, the Breusch-Pagan Lagrange Multiplier (LM) test, and the Hausman Test. A summary of the tests used in the model selection and their results are presented in Section 5.1, Table 5.1.

The fixed-effects estimator, also known as the within estimator, is based on

OLS estimation, implemented on time-demeaned data. The process involves subtracting individual over-time averages from the original equation, eliminating the intercept and unobserved effect (i.e., constant individual factor) to solve the omitted variable bias. The fixed-effects estimator is then obtained by OLS regression using time-demeaned variables (Wooldridge 2012).

The general one-way model equation takes the following form:

$$y_{it} = \beta_1 x_{it1} + ... + \beta_k x_{itk} + \gamma_i + \epsilon_{it}; i = 1, ..., n, t = 1, ..., T, \tag{5.1}$$

where the subscripts i and t represent the country and time period, respectively. The dependent variable y_{it} represents the number of reported suspicious transactions in the corresponding country and year, while the explanatory variables x_{itj}, $j = 1, \ldots, k$, consist of macroeconomic, crime-specific, and enforcement variables recorded in the respective country and time period. The slope coefficient of the relevant regressor j is represented by β_j, the unobserved individual effect of the i-th country is represented by γ_i, and the error term is represented by ϵ_{it}. In case of the two-way model specification, there would also be an unobserved time effect at time t represented by δ_t.

The variables included in the final model were chosen based on the literature review and F-tests, following the principles of efficiency and parsimony. The final model therefore had the following set of variables:

$$\begin{aligned} STR_{it} = terr_{it} + traff_{it} + narc_{it} + cor_{it} + fraud_{it} \\ + theft_{it} + enf1_{it} + shad_{it} + pandit + \gamma_i + \epsilon_{it} \end{aligned} \tag{5.2}$$

For a detailed list of the explanatory variables and a further description of their selection, please refer to Chapter 4. For results of the estimation, please refer to Chapter 6.

The presence of heteroskedasticity and autocorrelation was revealed using the studentized Breusch-Pagan test and the Breusch-Godfrey test, respectively. To ensure valid statistical inference, these issues were addressed by using two-way robust covariance matrix estimation. While assuming strict exogeneity, an unbiased and consistent estimator was derived. However, this estimator is not the most efficient, since robust estimation was applied. A detailed discussion of these procedures and methods can be found in Section 5.1.

5.1 Methodology Details

Based on the variable diagnostics described in Chapter 4, Section 4.3, the initial model included the following explanatory variables: terrorism, trafficking in human beings, narcotics, corruption and bribery, fraud, robbery and theft, cybercrime, fragility, enforcement and its lagged forms, GDP *per capita*, size of the shadow economy, and pandemic. i.e.,

$$\begin{aligned} STR_{it} = terr_{it} + traff_{it} + narc_{it} + cor_{it} + fraud_{it} + \\ theft_{it} + cyber_{it} + frag_{it} + enf0_{it} + enf1_{it} + enf2_{it} + \\ enf3_{it} + gdp.pc_{it} + shad_{it} + pand_{it} + \gamma_i + \epsilon_{it} \end{aligned} \tag{5.3}$$

For further meanings behind these variables, please refer to Chapter 4, Section 4.1 or Table 4.1. This set of explanatory variables was then tested to determine the most appropriate estimation method and further edited to achieve the highest possible quality, represented by the adjusted R^2 (i.e., using the F-test) and a logical understanding of the collected data.

5.1.1 Estimation Method Selection and Final Model Development

In order to select the appropriate panel data model, the following estimation methods were examined: pooled OLS estimation, one-way fixed effects estimation, two-way fixed effects estimation and random effects estimation, and the following tests were performed: the Fisher (F) test, the Breusch-Pagan Lagrange Multiplier (LM) test and the Hausman test. For results of individual tests see Table 5.1.

The Fisher Test To determine the more suitable model between pooled OLS and fixed effects, a formal F-test was conducted on the two models, along the lines with the approach taken in Akbar *et al.* (2011). The Fisher test uses the pooled regression model as a baseline to identify the presence of individual effects, similar to the structure of the F-test for R^2 change. Under the null hypothesis, the F statistic has the following form and follows the F distribution with $n-1$ and $nT-n-k$ degrees of freedom:

$$F_{groupseffects} = \frac{R^2_{fix} - R^2_{pooled}}{1 - R^2_{LSDV}} * \frac{nT-n-k}{n-1} \sim F_{n-1,nT-n-k} \tag{5.4}$$

In this context, T represents the aggregate count of temporal observations, n stands for the number cross-sectional units, and k indicates the number of explanatory variables within the model. If a significant improvement in the R^2 value is observed, it suggests the existence of statistically significant effects within the groups, and the fixed effects model should be preferred over the pooled OLS model. Similarly, in testing for two-way effects, the one-way fixed effects model is used as a baseline to compare against the two-way alternative.

The results of this analysis showed the significance of individual fixed effects and suggested using one-way fixed effects estimation over pooled OLS estimation.

The Breusch-Pagan Lagrange Multiplier Test To compare the pooled OLS estimation with the random effects estimation, the Breusch-Pagan Lagrange Multipliers (LM) test was performed (Breusch & Pagan 1980). The test takes the pooled OLS model as the baseline and tests for the presence of significant random individual effects against the random effects alternative. Under the null hypothesis, the LM statistic has the following form and follows the χ_1^2 distribution:

$$LM = \frac{nT}{2(T-1)} * \left[\frac{\sum_i (\sum_t \hat{u}_{it})^2}{\sum_i \sum_t \hat{u}_{it}^2} - 1 \right]^2 \sim \chi_1^2 \tag{5.5}$$

In this context, $\hat{u}_{it}$ represents the number of residuals obtained from the pooled OLS estimation method.

The outcomes of this analysis emphasized the significance of random individual effects and suggested utilizing a random effects estimation method over the pooled OLS estimation method.

The Hausman Test To compare the random effects model with the fixed effects model, the Hausman test, i.e., the Durbin-Wu-Hausman test; Hausman (1978). This test evaluates the null hypothesis that the coefficients estimated by the efficient random effects estimator are numerically equal to those estimated by the consistent fixed effects estimator. If the coefficients are not statistically significant, it is safe to use the random effects estimation. Otherwise, fixed effects should be used instead.

Under the null hypothesis, the Wald statistic follows χ_k^2 distribution with k degrees of freedom. In the formula below, k stands for the number of independent variables.

$$W = (\hat{\beta}_{FE} - \hat{\beta}_{RE})'(Var(\hat{\beta}_{FE}) - Var(\hat{\beta}_{RE}))^{-1}(\hat{\beta}_{FE} - \hat{\beta}_{RE}) \sim \chi^2_k \qquad (5.6)$$

The analysis determined that the random effects model is inconsistent and therefore, the fixed effects model is a more appropriate estimation method.

Table 5.1: Estimation Method Selection Test Results

estimation methods	test	result	p-value
Pooled OLS Fixed Effects	F test for individual effects F = 17.091	H1: significant effects df1 = 26, df2 = 120	< 2.2e-16
Pooled OLS TW Fixed Effects	F test for individual effects F = 15.158	H1: significant effects df1 = 30, df2 = 116	< 2.2e-16
Fixed Effects TW Fixed Effects	F test for twoways effects F = 1.3379	H1: significant effects df1 = 4, df2 = 116	0.2601
Pooled OLS Random Effects	Breusch-Pagan LM test chisq = 13.665	H1: significant effects df = 1	0.0002197
Random Effects Fixed Effects	Hausman test chisq = 143.76	H1: one m. is inconsist. df = 15	< 2.2e-16

Based on the results of the aforementioned diagnostics, it can be concluded that the fixed effects model is the most appropriate for the following analysis. Both the pooled OLS and random effects estimation methods were rejected at 1% significance level. The one-way fixed effects model was not rejected, with an F-test p-value of 0.2601 in the initial estimation and a p-value of 0.3472 in the final estimation after selecting the most efficient explanatory variables, following the principles of efficiency and parsimony. Therefore, the F-test does not imply heterogeneity across time periods.

Based on the Hausman test, the fixed effects model is consistent. This implies heterogeneity across cross-sectional units (i.e. individual effects that remain constant over time) and correlation between individual effects and explanatory variables.

F-Test for Variable Selection After the most appropriate estimation method is established, it was necessary to improve the efficiency of the model. Variables used to estimate the final model were selected based on an F-test of similar form to Equation 5.4.

The selection process involved removing certain variables, typically those with the highest p-values (i.e., lowest statistical significance), and testing whether the adjusted R^2 improved. After selecting the final set of independent variables, the estimation method was verified by conducting another F-test for two-way effects. The final model is represented by Equation 5.2.

5.1.2 Fixed Effects Estimation Assumptions Testing

To ensure reliable statistical inference, the assumptions of the within estimator needed to be tested.

The model takes on the form of Equation 5.1, resp. Equation 5.2, therefore the linearity and model form assumption is satisfied.
However, random sample assumption is violated. The principle of the random sample is that there is no contemporaneous correlation between variables, implying that each unit in the sampled population has the same probability of being chosen. Since the underlying dataset consists of countries within the European Union, there is a significant possibility that the cross-sectional units might be correlated and influence one another. This logic is confirmed by the Pesaran CD test for cross-sectional dependence in panels, which is referenced in Table 5.2. The assumption of random sampling is essential for unbiasedness and representativeness of derived estimators. Its violation can be addressed by using two-way clustered robust standard errors. Two-way clustering addresses this issue by adjusting the standard errors to account for this correlation structure. Essentially, it clusters both at the panel level and at the time level. This results in standard errors that are robust to arbitrary correlation within each cluster.

Table 5.2: Pesaran CD Test for Cross-Sectional Dependence

test statistic	result	p-value
z = 2.5348	H1: cross-sectional dependence	0.01125

The model only includes time-varying variables and there are no perfect linear relationships among the explanatory variables, as confirmed by procedures described in Chapter 4, Section 4.3 or alternatively depicted by the correlation matrix represented by Table B.2.
Strict exogeneity, meaning no correlation between the explanatory variables or

the unobserved effects in all time periods and the idiosyncratic error in any time period, is assumed since the model does not contain lagged instances of the regressand as regressors. Additionally, no simultaneous causality, measurement errors, or omitted variables, which are addressed by using a fixed effects model, are expected.
Based on the Studentized Breusch-Pagan test, there is sufficient evidence to reject the assumption of homoskedasticity, which assumes constant variance, at a 1% significance level. Therefore, it can also be concluded that the estimated covariance matrix is incorrect and statistical inference is not valid. Heteroskedasticity can be addressed by using robust standard estimation (Hayes & Cai 2007).

Table 5.3: Studentized Breusch-Pagan Test for Homoskedasticity

test statistic	result	p-value
BP = 49.187, df = 8	H1: heteroskedasticity	1.531e-07

Another risk to the accuracy of the outcomes is serial correlation in the data. To detect any such correlations, the Breusch-Godfrey test was utilized. According to the test described in Breusch (1978), the null hypothesis that there is no autocorrelation in the idiosyncratic errors is rejected at a 1% significance level. Therefore, it is concluded that autocorrelation exists in the underlying data. To address this issue, a robust covariance matrix estimation approach that provides standard errors robust to both heteroskedasticity and autocorrelation was used.

Table 5.4: Breusch-Godfrey Test for Serial Correlation

test statistic	result	p-value
LM test = 47.145, df = 10	H1: autocorrelation	8.924e-07

The final assumption of the fixed effects model is that the residuals are normally distributed. If this assumption holds, the within estimator is also normally distributed, and the t and F statistics follow t and F distributions, respectively. To confirm this assumption, a Shapiro-Wilk normality test was conducted on the residuals. However, the test results provide enough evidence to reject the null hypothesis of normal distribution.

Table 5.5: Shapiro-Wilk Normality Test

test statistic	result	p-value
W = 0.84043	H1: residuals not normally distributed	5.234e-12

This issue cannot be remedied, but the extent to which the residuals resemble a normal distribution can be inspected. Since the dataset contains 162 observations (i.e. a sufficiently high number of observations), the central limit theorem can be applied, and at least asymptotic normality can be concluded. In this case, the majority of residuals follow the desired normal distribution, with only a few instances at the margins deviating. Asymptotic normality is therefore verified.

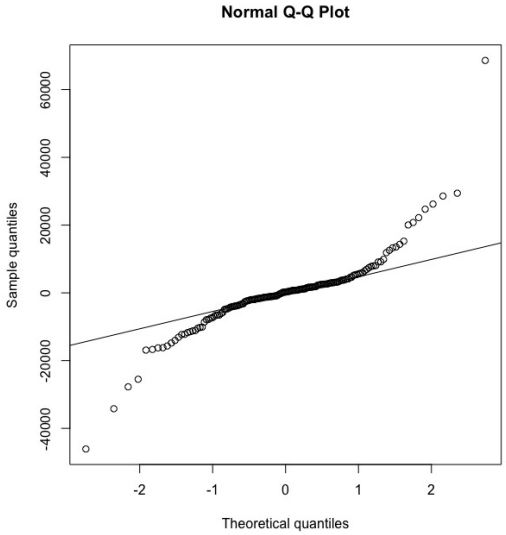

Figure 5.1: Asymptotic Normality

After testing assumptions FE.1 through FE.7, the presence of heteroskedasticity, autocorrelation, and possible cross-sectional dependence was discovered. To address these issues, two-way robust covariance matrix estimation was used. This solution enabled the model to provide reliable hypothesis testing, but at the cost of optimal efficiency. Consequently, the derived estimator is only unbiased and consistent, and not the best linear unbiased estimator (BLUE).

The robust standard errors are included in Chapter 6: Empirical Results, Table 6.1, alongside the estimated coefficients of the model.

Chapter 6

Empirical Results

This chapter presents and discusses the findings derived from the model estimation. The empirical analysis focuses on verifying the proposed hypotheses, with the aim of revealing potential links among the examined variables, and possible roots behind these relationships.

Table 6.1: Estimation Results

dependent variable: STR			
variable	estimate	robust std. error	
terr	-593.310	364.270	
traff	39.107	28.648	
narc	0.605	0.179	***
cor	1.030	0.921	
fraud	-0.383	0.066	***
theft	-0.132	0.019	***
enf1	$-2,947.389$	1826.154	
shad	$-2,114.993$	$1,243.060$	.
pand	$6,563.197$	$3,408.366$	.
Observations	162		
Total sum of squares	$6.1886e+10$		
Resid. sum of squares	$1.9575e+10$		
R^2	0.6837		
Adjusted R^2	0.59584		
F Statistic	30.2617	(df = 9; 126)	***
Significance codes:	0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1		

In the final analysis, the model described in Equation 5.2 was evaluated and the estimation results are listed in Table 6.1. The model produced several statistically significant variables at different significance levels, with the overall joint statistical significance of the regression at a 1% significance level.

The model has an R^2 value of 0.6837 and an adjusted R^2 value of 0.5958. This indicates that 59.58% of the overall variability in the dependent variable *STR* is explained by the model. To ensure valid hypothesis testing, standard errors were recalculated using two-way robust covariance matrix estimation.

The coefficient of reported terrorist attacks *(terr)* suggests a decrease of nearly 600 units in STRs after a unit increase in reported terrorist attacks, *ceteris paribus*. This might indicate an adjustment in recognition methods following a new pattern leading up to the incident. Moreover, according to Bauer & Levitt (2020), localised terrorist financing is becoming more common, suggesting that the source of the funds, the centre of the attack and involved reporting entities are closer to one another, and the variable therefore has a higher interpretative value. However, the estimated coefficient can be imprecise, as the value of its recalculated robust standard error is over 360, suggesting that the true parameter has a very large range of potential values. Furthermore, the estimate did not turn out to be statistically significant at a 10% significance level.

Similarly, the positive effect of a 39-unit increase in STRs with a unit increase in reported offenses of trafficking in human beings *(traff)*, *ceteris paribus*, did not turn out to be statistically significant at a 10% significance level. The robust standard error of this estimate, which is almost 73% of the value of the coefficient, also suggests low precision of this variable.

Drug-related offences[1] *(narc)* have a positive effect on STRs. Although the effect may be small, i.e., a 0.6-unit increase in STRs for every unit increase in reported drug-related offences, it is statistically significant at a 1% significance level. Thus, the data provides sufficient evidence to support the conclusion that drug-related offences have a positive impact on STR levels (hypothesis 3).

The regression analysis surprisingly provided enough evidence to reject the hypothesis of a statistically significant effect of reported cases of corruption *(cor)* on STR levels (hypothesis 1). Although the effect was positive, its low statistical significance somewhat contradicts the majority of the existing litera-

[1] In this context, *drug-related offences* mean all offences listed in section 0601 of the ICCS system, i.e., unlawful acts involving controlled drugs and precursors.

ture, which suggests an inefficiency in the AML/CFT framework in the European Union.

The number of reported cases of fraud has a negative effect on STR levels. Holding all other factors constant, every one-unit increase in reported fraudulent offenses decreases STRs by approximately 0.4, with a robust standard error of 0.066. This result is statistically significant at a 1% significance level and supports hypothesis 2, which posits an effect of reported fraud offenses on STR levels.

The coefficient of reported theft offenses is negative and statistically significant at a 1% significance level. While the effect is small, this outcome contradicts possible expectations that proceeds from theft would need to be legalized, which could trigger an STR. Therefore, to draw further conclusions, a more thorough analysis of this effect is necessary.

Following concerns raised against the conclusion of Braun *et al.* (2016), who suggested that mutual evaluations[2] have a significant positive effect on STR levels, the regression analysis did not demonstrate statistical significance of variables *enf0, enf1, enf2* or *enf3* at a 10% significance level. Based on this result, the hypothesis that mutual evaluations and follow-up re-ratings increase STR levels (hypothesis 6) is rejected. Furthermore, the estimated effect is negative with questionable reliability and precision due to the size of the robust standard error.

The size of the shadow economy measured in terms of GDP *(shad)*, had a large statistically significant negative effect at a 10% significance level. This outcome provides enough evidence to technically reject the hypothesis that institutional strength increases STR levels (hypothesis 4). However, using only the size of the shadow economy as a proxy for institutional strength may be misleading in interpreting the hypothesis. A more comprehensive measure of institutional strength would be the size of the shadow economy along with fragility expressed by the Fragile States Index. Nevertheless, the variable *frag* did not prove to be statistically significant and was eliminated from the model during model development, as indicated by an F-test result.
The issue with the effect sign of this variable could be attributed to the fact that the shadow economy often goes unnoticed by authorities and uses methods

[2]In this analysis, both mutual evaluations and follow-up discussions were considered, as well as lagged instances of these variables, since there can occur an improvement in the AML/CFT system and consequential technical re-rating of compliance with the FATF Standard even between rounds of MERs. The dummy variable behind this effect is denoted as *enf0, enf1, enf2*, and *enf3*.

of financial communication hidden from the observing authorities such as cash from hand to hand, which can be more difficult for reporting entities to detect (Medina & Schneider 2018). Therefore, the larger the shadow economy, the more likely cash-based transactions will occur in the country, leading to fewer suspicious transactions being detected.

The global COVID-19 pandemic *(pand)*, contrary to initial assumptions, had a positive effect on STR levels. At a 10% significance level, it increased the number of reported suspicious transactions by over 6.5 thousand, *ceteris paribus*. Technically, hypothesis 6 would be therefore rejected. This result suggests that the increase in online payments and changes in behavior patterns during the pandemic may outweigh the negative effects of stretched capacities and delayed training. On the other hand, it might also signal considerable over-reporting due to the confusion caused by the rapid change of situation. The size of the robust standard error suggests a potential lack of precision in this variable, and further analysis in this area is recommended to provide more certainty.

Contrary to initial expectations and suggestions from existing literature, the size of an economy in terms of *GDP per capita* was found to be statistically insignificant and was therefore discarded during model development based on the result of an F-test. Similarly, cybercrime *(cyber)* was also discarded during model development due to its low statistical significance, even though there may be a growing need to legalize substantial proceeds of cybercrime.

Chapter 7

Conclusion

Money laundering is a criminal activity with far-reaching economic consequences. Although it is challenging to obtain precise estimates of the extent of money laundering, it is generally agreed that this issue needs to be addressed at both the country and international levels. However, as many authors of previously published works on this topic have pointed out, there is a lack of reliable data to fully evaluate the efficiency of existing AML/CFT frameworks and proposed or already implemented policies, and there are newly emerging threats that need to be examined. Additionally, there are many complex factors often working in opposite directions.

Despite the distinctive political configuration of the European Union that could offer insightful data on the issues described above, a comprehensive study has not yet been conducted. Furthermore, the COVID-19 pandemic has caused significant changes in the state of affairs previously analyzed by other authors.

Therefore, the goal of this thesis was to take advantage of this newly emerged situation and specific geographic location to explore potential drivers of STR levels. This was achieved by examining crime-specific, enforcement, and macroeconomic factors integrated into a newly compiled dataset.

The first part of the thesis offered a thorough review of the current literature regarding AML/CFT, present legislation and its efficiency, and potential drivers of money laundering and terrorist financing activities. It also incorporated new considerations based on specific events that arose during the analyzed time period. The second part of this thesis focused on developing hypotheses to address the proposed research questions and analyzing the underlying dataset with an econometric model as well as thorough description of the underlying methodological approach.

The present dataset was compiled using both international and country-level sources to gather information on the numbers of reported suspicious transactions in each country as well as the numbers of reported predicate offences as recognized by the European Union. Due to limited data availability, only 11 of the 22 recognized predicate offences could be evaluated. The dataset was then completed with macroeconomic and enforcement factors such as the size of the shadow economy or GDP *per capita*. Overall, a balanced panel dataset consisting of all 27 EU Member States between 2016 and 2021 was developed.

The fixed effects estimation method was selected based on results provided by the Fisher (F) test, the Breusch-Pagan Lagrange Multiplier (LM) test, and the Hausman Test. After testing the model assumptions FE.1 through FE.7, the presence of heteroskedasticity, autocorrelation, and possible cross-sectional dependence was discovered. To address these issues, two-way robust covariance matrix estimation was used. Consequently, the derived estimator is unbiased and consistent.

The final model produced several statistically significant variables, which then illustrated the outcomes of previously stated hypotheses and consequently provided answers to the initial research questions. Based on the empirical analysis, the number of reported terrorist attacks had a negative, statistically not significant effect, while reported offences of trafficking in human beings had a positive, statistically not significant effect on reported numbers of suspicious transactions. Reported drug-related offences had a positive and statistically significant effect. In contradiction to the initial expectation, reported cases of corruption did not prove to be statistically significant in explaining STR levels. On the other hand, reported cases of fraud turned out to be statistically significant at a 1% significance level with an overall negative effect while reported offences of theft had a negative and statistically significant effect. Contrary to Braun *et al.* (2016), mutual evaluations and follow-ups did not show a positive effect on STR levels. The size of the shadow economy showed a large, negative and statistically significant effect, while the pandemic had a large positive and statistically significant effect on STR levels.

Overall, based on the results of this analysis, the main drivers of STR levels in the EU between 2016 and 2021 were drug-related offences and the presence of the global pandemic. Therefore it is also possible to conclude that the list of predicate offences as recognized by the FATF or the EU is possibly not efficiently designed to identify potential streams of money laundering. However, it is difficult to conclude this fact with certainty since the list could have been

generally efficient in times before the pandemic of COVID-19, for which there was not enough data points to reliably estimate.

Potential policy recommendations arising from the conducted analysis would be to promote consistent reporting of meaningful data in, preferably, a widely-spoken language for further policy evaluation and improvement. Consequently, it seems crucial to implement a strong data-based structure for evaluation and improvement of existing policies, and proposals of new policies based on strong empirical foundations. Due to the ever-evolving situation around financial behaviour, money laundering, and financing of terrorism, it is also possible that the determinants of those illicit activities might change drastically in the future.

Finally, it is important to note that future analysis on this issue is necessary to further explain the present phenomena and to introduce new theories. In the future, the research could be potentially improved by considering regional dualism between EU Member States, which could indicate differences in the drivers of STR levels based on different economic structures. Moreover, future analyses can introduce a larger dataset and therefore improve the precision of derived estimates.

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Appendix A

Key Concepts of AML/CFT Frameworks

A.1 Definitions of Key Concepts

This section serves as a glossary, defining pivotal terms within the context of AML/CFT frameworks. Its purpose is to ensure a coherent and consistent understanding of these terms throughout the thesis, while also providing an accessible reference point.

Financial Action Task Force (FATF) The Financial Action Task Force (FATF) is the leading global organization dedicated to tackling money laundering and terrorist financing. Established in Paris in 1989, the organization conducts research on how these activities are carried out and promotes global standards to address the associated risks (FATF 2023a).

The FATF Standards are based on the 40 FATF Recommendations, officially known as the International Standards on Combating Money Laundering and the Financing of Terrorism and Proliferation. Although they are not legally binding, they are globally considered as a form of soft international law (Terry 2010).

Once a country makes a political commitment to become FATF-compliant, it undergoes an evaluation based on the FATF Standards. The country receives a FATF Rating for compliance with the FATF Recommendations, ranging from non-compliant (NC) to partially compliant (PC), largely compliant (LC), and compliant (C). Additionally, the country is rated on the effectiveness of its

AMLC/CFT system, ranging from low effectiveness (LE) to moderate effectiveness (ME), substantial effectiveness (SE), and high effectiveness (HE).

A country's FATF Rating is regularly re-evaluated during mutual evaluation rounds and potential follow-ups. FATF-appointed experts conduct a mutual evaluation using a unified FATF methodology that results in a Mutual Evaluation Report (MER). This evaluation occurs through on-site visits once every several years. Outcomes of the mutual evaluations are discussed during regular FATF meetings of the FATF's decision-making body, the FATF Plenary, held every January, June, or October, and are then published on the FATF website (FATF 2023a).

FATF Associate Members (FATF-Style Regional Body (FSRB)) Overall, more than 200 countries and territories have pledged to enforce the FATF Standards, forming a unified global effort to counteract money laundering, organized crime, corruption, and terrorism. Evaluations of these countries and territories are facilitated through the cooperation of nine Associate Member organizations of the FATF (also known as the FATF-Style Regional Bodies) and various international partners.

Togerher with the FATF, the FSRBs form the FATF Global Network. There are 9 FSRBs altogether:

- the Asia/ Pacific Group on Money Laundering (APG),
- the Caribbean Financial Action Task Force (CFATF),
- the Committee of Experts on the Evaluation of Anti-Money Laundering Measures (MONEYVAL),
- the Eastern and Southern Africa Anti-Money Laundering Group (ESAAMLG),
- the Eurasian Group (EAG),
- the Financial Action Task Force of Latin America (GAFILAT),
- the GABAC,
- Inter Governmental Action Group Against Money Laundering in West Africa (GIABA), and
- the Middle East and North Africa Financial Action Task Force (MENAFATF).

Source: The list of the FATF-Style Regional Bodies was obtained from the official FATF website, for more details please refer to FATF (2023b).

Financial Intelligence Unit (FIU) Financial Intelligence Units are national institutions that collect and analyze information from the financial system provided by obligated entities when there is suspicion that a transaction is related to money laundering or financing of terrorism. FIUs typically serve as the national center for receiving and analyzing Suspicious Transaction Reports and other information related to money laundering or financing of terrorism. They also disseminate the results of their analyses (Egmont Group of Financial Intelligence Units 2023b).

The definition and roles of FIUs are outlined in the Egmont Charter, which was published by the Egmont Group of Financial Intelligence Units in 2013 and revised again in 2018 (Egmont Group of Financial Intelligence Units 2013). The Egmont Group is an international organization of FIUs that provides a secure platform for exchanging expertise and intelligence to combat money laundering and terrorist financing. The functions and operations of FIUs are also defined by the FATF Standards set by the FATF Recommendation 29.

High-Risk and Other Monitored Jurisdictions After each Plenary meeting in February, June, and October, the FATF publishes two lists: Jurisdictions under Increased Monitoring and High-Risk Jurisdictions subject to a Call for Action. These lists are based on the amount of risk a particular country poses for the international financial system. The purpose of publishing these lists is to maintain the reliability of the international financial system by publicly naming countries with notable deficiencies in their AML/CFT systems. The idea behind publicly announcing which countries pose a threat to the integrity of the international financial system is to put pressure on those territories to address their shortcomings and motivate them to make swift and substantial improvements (FATF 2023c). Each list contains a brief overview of the recent steps taken by each territory, as well as a mention of the strategic gaps that still need to be resolved.

The FATF's International Co-operation Review Group (ICRG) oversees the process of identifying jurisdictions that pose a threat to the international financial system. A country enters the ICRG review process if any of the following apply:

(i) It does not participate in a FSRB or does not allow mutual evaluation results to be published in a timely manner; or

(ii) It is nominated by a FATF member or an FSRB. The nomina-

tion is based on specific money laundering, terrorist financing, or proliferation financing risks or threats coming to the attention of delegations; or

(iii) It has achieved poor results on its mutual evaluation, specifically:

(i) it has 20 or more non-compliant (NC) or partially compliant (PC) ratings for technical compliance; or

(ii) it is rated NC/PC on 3 or more of the following Recommendations: 3, 5, 6, 10, 11, and 20; or

(iii) it has a low or moderate level of effectiveness for 9 or more of the 11 Immediate Outcomes, with a minimum of two lows; or

(iv) it has a low level of effectiveness for 6 or more of the 11 Immediate Outcomes.

Source: The description of the FATF High-Risk and other Monitored Jurisdictions and the related review process was obtained from the official FATF website, for more details please refer to FATF (2023c).

Once a jurisdiction enters the ICRG review process, it undergoes a one-year Observation Period. During this time, the jurisdiction works with the FATF or its FSRB to address any deficiencies in its AML/CFT regime before being publicly named in one of the above-mentioned lists. To be removed from the list, a jurisdiction must complete all or almost all of the steps outlined in its action plan.

Money Laundering and Financing of Terrorism Illegal operations such as drug trafficking, smuggling, human trafficking, or corruption can yield substantial profits for the parties who have committed them. By enjoying profits generated by illegal activities, offenders run the danger of alerting enforcement authorities and opening themselves up to legal action. Offenders consequently need to hide the illegal source of these actions in order to protect the proceeds of their crime from confiscation and enjoy them freely (van Duyne 1994).

According to the Financial Action Task Force, one of the most recognized entities in AML/CFT efforts, money laundering is defined as "the processing of criminal proceeds to disguise their illegal origin" (FATF 2023e), which can be

traced back to the Vienna Convention adopted by the General Assembly of the United Nations in 1988 (UNODC 1988).

As per the FATF Recommendations, money laundering should be criminalized in line with the United Nations Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, also known as the Vienna Convention, and the United Nations Convention against Transnational Organized Crime, also known as the Palermo Convention, which is the primary global mechanism in combating cross-border organized crime[1] (FATF 2023d).

More broadly, based on the 6th article of the Palermo Convention, all concerned parties must implement legislative and other necessary measures to establish the following as criminal offenses in accordance with their domestic law:

> *(i)* The conversion or transfer of property, knowing that such property is the proceeds of crime, for the purpose of concealing or disguising the illicit origin of the property or of helping any person who is involved in the commission of the predicate offence to evade the legal consequences of his or her action;
>
> *(ii)* The concealment or disguise of the true nature, source, location, disposition, movement or ownership of or rights with respect to property, knowing that such property is the proceeds of crime;
>
> *Source:* The definition of money laundering was obtained from the Palermo Convention, for more details please refer to UNODC (2000).

Similarly to the legislative classification of money laundering, the FATF suggests to criminalize financing of terrorism on the basis of the Terrorist Financing Convention, which implies that nations should criminalize the financing of terrorist acts, organizations, as well as individual terrorists, even in the absence of a direct connection to any specific terrorist act. These acts should also be designated as money laundering predicate offenses (FATF 2023d).

Predicate Offence Following the United Nations Convention Against Transnational Organized Crime (UNODC 2000), the term "predicate offence" refers to any offence generating proceeds that could be used to commit the offence of money laundering.

[1] For further information, please refer to UNODC (2023c).

Regarding the FATF methodology, particularly the FATF Recommendations, and the EU Anti-Money Laundering Directive (AMLD) methodology, the term *predicate offence* is often used interchangeably with "criminal activity" in general. The FATF recognizes a total of 21 groups of predicate offences, also known as designated categories of offences. Meanwhile, the EU identifies a total of 22 felonies listed as predicate offences to money laundering and financing of terrorism. A comprehensive overview of predicate offences recognized by both the FATF and the EU is provided in Table A.1.

Reporting (Obliged) Entity The term "obliged entity" refers to a type of business or organization that is legally required to comply with specific AML/CFT regulations.

In the context of the EU's 5th Anti-Money Laundering Directive, obliged entities are typically organizations that are at risk of being exploited for the purposes of money laundering or terrorist financing due to their business activities. According to Article 2 of the 5AMLD these entities include:

(i) credit institutions;

(ii) financial institutions;

(iii) the following natural or legal persons acting in the exercise of their professional activities:

  (i) auditors, external accountants and tax advisors;

  (ii) notaries and other independent legal professionals;

  (iii) trust or company service providers;

  (iv) estate agents;

  (v) other persons trading in goods to the extent that payments are made or received in cash in amount of EUR 10 000 or more, whether the transaction is carried out in a single operation or in several operations which appear to be linked;

  (vi) providers of gambling services;

  (vii) providers engaged in exchange services between virtual currencies and fiat currencies;

  (viii) custodian wallet providers;

(ix) persons trading, storing or acting as intermediaries in the trade of works of art, including when this is carried out by art galleries, auction houses or free ports, where the value of the transaction or a series of linked transactions amounts to EUR 10 000 or more.

Source: The list of obliged entities was obtained from Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 on the Prevention of the Use of the Financial System for the Purposes of Money Laundering or Terrorist Financing (European Parliament and European Council 2018).

The obligation of these entities typically involves implementing procedures of customer due diligence, monitoring transactions, and reporting suspicious activities to the relevant national FIU.

Similarly, the Financial Action Task Force uses the term Designated Non-Financial Businesses and Professions (DNFBPs) to refer to businesses that are required to implement AML/CFT measures. The categories of DNFBPs outlined by the FATF are similar to the list of obliged entities under the 5AMLD.

Suspicious Transaction Report (STR) A Suspicious Transaction Report is a document prepared by financial institutions and other obligated entities to report suspicious activity to FIUs. Once the FIU receives the STR, it conducts a thorough analysis to verify the suspicion. If the suspicion is confirmed, the report is forwarded to enforcement authorities for investigation as a money laundering or terrorist financing offense. STRs therefore play a significant role in identifying and combating money laundering and terrorist financing.

The criteria for filing an STR varies between EU Member States. However, it is typically required when a transaction or behaviour seems inconsistent with a customer's legitimate business or personal activities, or unusual for that type of account in general. STRs are also triggered when a transaction or a set of linked transactions exceed a certain amount.

In the context of effective EU AML legislation, Article 33 of the 5AMLD states that Member States must "require obliged entities, and their directors and employees where applicable, to promptly inform the FIU when the obliged entity knows, suspects, or has reasonable grounds to suspect that funds, regardless of their amount, are the proceeds of criminal activity or are related to terrorist financing. All suspicious transactions, including attempted transactions, must be reported" (European Parliament and European Council 2018).

A.2 Global AML/ CFT Practices

There are several internationally recognized anti-money laundering and counter-terrorism financing guidance sets issued by various international bodies, including:

- The Financial Action Task Force (FATF) Recommendations
- The Basel Committee on Banking Supervision (BCBS) Guidelines
- The Wolfsberg Group AML Principles
- United Nations (UN) Conventions
- European Union (EU) Anti-Money Laundering Directives (AMLDs)

Among the above mentioned institutions, the FATF is considered to be the leading standard setter for AML/CFT efforts (Isa *et al.* 2015).

The Financial Action Task Force is an independent intergovernmental organization that develops and promotes regulatory standards to protect the global financial system from money laundering, terrorist financing, and the financing of weapons of mass destruction proliferation. The FATF also collaborates with other international organizations such as the International Monetary Fund (IMF), the World Bank, the United Nations (UN), and regional stakeholders, in seeking for national-level vulnerabilities[2].

The FATF Recommendations, which are continuously updated since their adoption by the FATF Plenary in February 2012, are considered the global standard in anti-money laundering and counter-terrorist financing practices and have been endorsed by over 200 countries.

Despite the countries of the FATF Member Jurisdictions having varied legal, administrative, operational, and budgetary frameworks, and therefore not being able to implement the same countermeasures to money laundering, terrorist financing, and the financing of proliferation of weapons of mass destruction, the FATF Recommendations provide an international norm to be adapted to the particular circumstances of individual countries (FATF 2023d).

[2]The G-7 Summit held in Paris in 1989 led to the establishment of the FATF, which has since closely collaborated with prominent international organizations such as the IMF, World Bank, United Nations, and 9 FATF-Style Regional Bodies (FATF 2023a).

A.3 AML/ CFT Framework in the EU

The following section provides an overview of the institutional and legislative framework governing AML/CFT within the European Union. The institutional structure supports the effective execution and enforcement of the AML/CFT provisions in the EU. Subsection A.3.1 outlines the key actors, their roles, interactions, and the overall functioning of the system in relation to AML/CFT.

Further, Subsection A.3.2 delves into the legislative structure, particularly the evolution and implications of major directives such as the Fourth Anti-Money Laundering Directive (4AMLD), the Fifth Anti-Money Laundering Directive (5AMLD), and the proposal for the Sixth Anti-Money Laundering Directive (6AMLD). Each of these legislative pieces mark significant milestones in strengthening the AML/CFT regime in the EU by addressing emergent threats and gaps in the existing laws, while also aligning the EU's framework with international standards.

A.3.1 Institutional Structure of the AML/CFT Framework in the EU

To support global counter-terrorism and anti-money laundering efforts, the European Union has enacted strict laws through the European Commission. The European Commission reviews how EU countries implement these laws and evaluates the risks affecting the EU's single market in partnership with the Financial Action Task Force (European Commission 2023b).

Furthermore, the European Commission collaborates closely with responsible EU-level authorities to ensure effective enforcement. One such authority is the European Banking Autority (EBA), which was established as a component of the European System of Financial Supervision (ESFS) and assumed all the duties and functions previously held by the Committee of European Banking Supervisors (CEBS). Regarding AML/CFT practices, the European Banking Authority sets standards for regulating financial institutions and monitors violations of EU legislation (EBA 2016).

Within the EU, every Member Country has a National Competent Authority (NCA) established as an AML supervisor responsible for ensuring that obliged entities within their jurisdiction comply with the EU AML/CFT regulations. Obliged entities monitor transactions from both EU and third countries, and apply customer due diligence to ensure that they know the final customer.

In high-risk situations or for transactions originating from high-risk third countries, enhanced customer due diligence is applied. The European Commission determines the list of such high-risk third countries in accordance with the fifth EU Anti-Money Laundering Directive (5AMLD). Additionally, Member States can also determine their own lists under national risk assessments.

When suspicion is aroused, the obliged entity must report the transaction to the local FIU. The FIU analyzes the report and shares it with other FIUs in different Member States, creating an international network of cooperating bodies that extends beyond the European Union (European Commission 2018). The Egmont Group of Financial Intelligence Units is an entity that associates all FIUs and encourages their communication. It was established under the sponsorship of the Financial Action Task Force in 1995.

Financial Intelligence Units are state authorities that act as intermediaries between the private sector and law enforcement organizations. They may also represent the local NCA (Council of Europe 2023). One of the main functions of FIUs is the receipt, analysis, and transmission of Suspicious Transaction Reports. FIUs are particularly effective in analyzing STRs because they can access beneficial ownership registers and central bank account registers (European Commission 2018), which provide valuable information.

If the analysis confirms a violation of legislation, the initiative is forwarded to the law enforcement authorities of the local government, the AML Supervisor, or other competent authority, depending on the local structure. In some cases, the law enforcement power is also integrated within the local FIU (Council of Europe 2023).

A.3.2 Legislative Structure of the AML/CFT Framework in the EU

The European Union introduced the first anti-money laundering directive in 1990 to protect the international financial system from exploitation for money laundering purposes. The directive required obliged entities to implement customer due diligence procedures when initiating a business relationship. This included identifying and authenticating clients, overseeing transactions, and reporting suspicious activities (European Commission 2023b). Since then, the AML/CFT legislation in the EU has undergone numerous amendments to improve the framework in response to newly emerging threats and existing loopholes, further decreasing the exploitability of the international financial system.

4AMLD In 2015, the European Union introduced a modernized regulatory framework, consisting of two legislative instruments: the 4th Anti-Money Laundering Directive (officially known as Directive (EU) 2015/849 on preventing the use of the financial system for money laundering or terrorist financing, abbreviated as 4AMLD), and the Regulation (EU) 2015/847 on information on the payer accompanying transfers of funds, which aims to provide more transparency in transfers of funds and make it easier to track criminals.

Both of these documents closely adhere to the FATF 40 Recommendations, often extending beyond the scope recommended by the FATF (European Commission 2023b).

The Fourth Anti-Money Laundering Directive introduced several key improvements to the framework, including an enhanced risk-based approach to AML/CFT that requires more advanced risk assessments from EU Member States and obliged entities. The directive also expanded the scope of entities and types of transactions covered[3], required central registers of beneficial ownership for companies and trusts, extended the definition of politically exposed persons, and lowered the threshold for prepaid cards[4]. Additionally, the directive increased cooperation between Financial Intelligence Units across the EU and extended their powers to request further information (European Parliament and European Council 2015).

5AMLD The 5th Anti-Money Laundering Directive (Directive (EU) 2018/843) was officially published in the Official Journal of the European Union on June 19, 2018 and required implementation by Member States by January 10, 2020. This Directive provided significant modifications to the 4th Anti-Money Laundering Directive by enhancing the EU's ability to prevent the exploitation of the financial system for money laundering or financing terrorist activities.

These amendments include enhanced due diligence (Article 20), a broadened scope of definitions for virtual currencies and custodian wallet providers (Article 1), lower thresholds for identification, and wider customer verification requirements for prepaid cards (Articles 12 and 13). There is also an expanded definition of Politically Exposed Persons (Article 20), an obligation for Mem-

[3]The directive expanded the scope of obliged entities to encompass all gambling services, not just casinos, as well as providers of goods for cash payments of 10,000 EUR or more. However, some exceptions are allowed at the country level based on proven low risk of money laundering and financing of terrorism.

[4]In response to concerns about the potential misuse of prepaid cards, the directive has lowered the customer identification threshold from 250 EUR to 150 EUR.

ber States to carry out and regularly update national risk assessments (Article 7), facilitation of cooperation and information exchange among Financial Intelligence Units (Articles 53 and 54), and a list of high-risk third countries[5] compiled based on their strategic deficiencies (Article 9). The Directive also directly addresses several of the FATF Recommendations while sharing many definitions of terms regarding the focus of both the Directive and the FATF Recommendations (European Parliament and European Council 2018).

6AMLD On July 20, 2021, the European Commission introduced a comprehensive set of legislative initiatives to enhance the EU's capacity to combat money laundering and financing of terrorism. The package aims to align AML/CFT regulations across the EU and proposes the creation of a dedicated EU authority to combat money laundering[6]. This legislative package also contains the amendment to the 5AMLD, the 6th Anti-Money Laundering Directive (6AMLD). The objective is to improve the ability to detect suspicious transactions and activities and eliminate the vulnerabilities exploited by criminals to launder illegal proceeds or fund terrorist activities through the financial system (European Commission 2023a).

[5]The high-risk third countries according to the European Commission are Afghanistan, The Bahamas, Barbados, Botswana, Cambodia, Democratic People's Republic of Korea, Ghana, Iran, Iraq, Jamaica, Mauritius, Myanmar, Nicaragua, Pakistan, Panama, Syria, Trinidad and Tobago, Uganda, Vanuatu, Yemen, and Zimbabwe.

[6]The proposed new EU authority that would take over the AML/CFT supervision is to be called the EU AML Authority (AMLA).

Table A.1: Predicate Offences

FATF-recognized predicate offences	EU-recognized predicate offences
(i) participation in an organised criminal group and racketeering;	*(i)* participation in an organised criminal group and racketeering;
(ii) terrorism, including terrorist financing;	*(ii)* terrorism;
(iii) trafficking in human beings and migrant smuggling;	*(iii)* trafficking in human beings and migrant smuggling;
(iv) sexual exploitation, including sexual exploitation of children;	*(iv)* sexual exploitation;
(v) illicit trafficking in narcotic drugs and psychotropic substances;	*(v)* illicit trafficking in narcotic drugs and psychotropic substances;
(vi) illicit arms trafficking;	*(vi)* illicit arms trafficking;
(vii) illicit trafficking in stolen and other goods;	*(vii)* illicit trafficking in stolen and other goods;
(viii) corruption and bribery;	*(viii)* corruption;
(ix) fraud;	*(ix)* fraud;
(x) counterfeiting currency;	*(x)* counterfeiting of currency;
(xi) counterfeiting and piracy of products;	*(xi)* counterfeiting and piracy of products;
(xii) environmental crime (for example, criminal harvesting, extraction or trafficking of protected species of wild fauna and flora, precious metals and stones, other natural resources, or waste);	*(xii)* environmental crime;
(xiii) murder, grievous bodily injury;	*(xiii)* murder, grievous bodily injury;
(xiv) kidnapping, illegal restraint and hostage-taking;	*(xiv)* kidnapping, illegal restraint and hostage-taking;
(xv) robbery or theft;	*(xv)* robbery or theft;
(xvi) smuggling; (including in relation to customs and excise duties and taxes);	*(xvi)* smuggling;
(xvii) tax crimes (related to direct taxes and indirect taxes);	*(xvii)* tax crimes related to direct taxes and indirect taxes;
(xviii) extortion;	*(xviii)* extortion;
(xix) forgery;	*(xix)* forgery;
(xx) piracy; and	*(xx)* piracy;
(xxi) insider trading and market manipulation.	*(xxi)* insider trading and market manipulation; and
	(xxii) cybercrime.

Source: The FATF-recognized predicate offences were obtained from the FATF Recommendations (FATF 2023d) and the EU-recognized predicate offences were obtained from Directive (EU) 2018/843 of the European Parliament and of the Council of 30 May 2018 on the prevention of the use of the financial system for the purposes of money laundering or terrorist financing (5AMLD, European Parliament and European Council (2018)), amending Directive (EU) 2015/849 of the European Parliament and of the Council (4AMLD).

Appendix B

Further Results

Table B.1: Descriptive Statistics

variable	minimum	maximum	median	mean	std.dev	coef.var
STR	174.0	298,507	7,322	25,387	40,032	1.58
terr	0	54.00	0	2.340	6.660	2.85
traff	0	1,094	14.00	76.06	176.23	2.32
sex	17.00	74,227	1,851	6,699	12,269	1.83
narc	283.0	416,047	8,813	52,534	100,608	1.92
cor	2	21,828	2,152	3,552	4,970	1.40
fraud	221.0	910,352	8,601	74,333	170,009	2.29
murd	101.0	357,886	2,001	23,706	63,730	2.69
kidn	0	5,062	78.50	532.0	1,175	2.21
theft	1,459	2,356,612	114,699	294,846	481,758	1.63
cyber	2	19,963	1,195	3,452	4,729	1.37
envir	0	12,603	386.0	1,663	2,777	1.67
frag	14.60	64.00	38.15	36.36	12.01	0.33
enf0	0	1	0	0.260	0.440	1.70
enf1	0	1	0	0.220	0.420	1.88
enf2	0	1	0	0.200	0.400	2.02
enf3	0	1	0	0.130	0.340	2.60
gdp.pc	6,840	112,780	23,815	30,715.68	20,557	0.67
shad	6.100	32.93	17.20	17.570	6.820	0.39
pand	0	1	0	0.330	0.470	1.42

Table B.2: Correlation Matrix After Controlling for Multicollinearity

	terr	traff	narc	cor	fraud	theft	cyber	frag	enf0	enf1	enf2	enf3	gdp.pc	shad	pand
terr	1														
traff	0.51	1													
narc	0.38	0.38	1												
cor	0.07	0.02	0.3	1											
fraud	0.22	0.26	0.63	0.5	1										
theft	0.65	0.67	0.68	0.36	0.74	1									
cyber	0.46	0.43	0.59	0.48	0.7	0.78	1								
frag	-0.01	-0.03	-0.15	-0.25	-0.25	-0.18	-0.2	1							
enf0	-0.07	-0.18	-0.07	0.07	-0.1	-0.1	-0.05	-0.1	1						
enf1	-0.07	-0.13	-0.03	0.06	-0.06	-0.09	0.01	-0.12	0.16	1					
enf2	-0.08	-0.08	0.09	0.06	0.02	-0.01	0.12	-0.15	0.24	0.15	1				
enf3	0.02	-0.06	0.12	0.12	0.07	0.02	0.22	-0.19	0.11	0.19	0.18	1			
gdp.pc	0.02	0.01	0.09	0.09	0.14	0.13	0.13	-0.72	0.01	0.03	0.15	0.17	1		
shad	-0.12	-0.09	-0.27	-0.22	-0.29	-0.31	-0.31	0.79	-0.08	-0.09	-0.14	-0.19	-0.74	1	
pand	-0.12	0	0	-0.01	0.01	-0.08	0.13	-0.08	0	0.19	0.27	0.31	0.06	0.04	1