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The AML/CFT in the European countries: The Impact of Eastern European Geopolitical Tensions

Bachelor's Thesis

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Abstract

This thesis examines the determinants of suspicious transaction reports (STRs) across 35 European countries from 2012 to 2023, focusing on the impact of the Russian invasion of Ukraine. A balanced panel dataset was constructed using data from national financial intelligence units, macroeconomic indicators, and conflict-related variables. The empirical analysis employs a fixed effects panel regression model to control for country-specific heterogeneity and persistent trends, enabling the disentanglement of structural and shock-driven effects.

The findings indicate that inflation shocks and remittances are the most persistent catalysts of discrepancies in STR reporting. At the same time, periods after above-trend GDP growth are associated with diminished levels of reported suspicious activity. In contrast, variables including unemployment, net migration, foreign direct investment, and war refugee inflows do not exert robust effects once country-level trends are accounted for. Furthermore, the observed period saw no statistically significant shifts in STR dynamics following the Russian invasion. These findings emphasise the pivotal role of macroeconomic instability, rather than acute geopolitical events, in shaping STR activity across European AML/CFT systems. They underscore the importance of harmonised data collection and rigorous evaluation of STRs as proxies for financial crime detection.

JEL Classification	K42, K14, G28, G18, F51, O17
Keywords	AML, CFT, Money Laundering, STR

Title	The AML/CFT in the European countries: The Impact of Eastern European Geopolitical Tensions

Abstrakt

Tato práce zkoumá determinanty oznámení o podezřelém obchodu (OPO) ve 35 evropských zemích v období 2012 až 2023 se zvláštním zaměřením na dopad ruské invaze na Ukrajinu. Byla sestavena vyvážená panelová datová sada založena na údajích z národních finančně analytických úvarů, makroekonomických ukazatelů a proměnných, které souvisejí s konfliktem. Empirická analýza využívá panelovou regresi s fixními efekty k zohlednění rozdílů mezi státy a dlouhodobými trendy, což umožňuje rozlišit strukturální a nárazové vlivy.

Zjištění ukazují, že inflační šoky a mezistátní převody peněz patří mezi nejvýznamnější činitele rozdílů ve vykazování OPO, zatímco období po nadtrendových růstech HDP jsou spojeny s nižší úrovní oznámení o podezřelých obchodech. Naproti tomu proměnné jako nezaměstnanost, čistá migrace, přímé zahraniční investice a příliv válečných uprchlíků nevykazují výrazný vliv po zohlednění rozdílů mezi státy. Ve sledovaném období rovněž nebyly zaznamenány statisticky významné změny v dynamice OPO v důsledku ruské invaze na Ukrajinu. Tato zjištění zdůrazňují klíčovou roli makroekonomické nestability na rozdíl od akutních geopolitických událostí při utváření OPO v evropských systémech AML/CFT a poukazují na potřebu jednotného sběru dat a pečlivého hodnocení OPO jako ukazatele finanční kriminality.

Klasifikace JEL	K42, K14, G28, G18, F51, O17
Klíčová slova	AML, CFT, praní špinavých peněz, STR

Název práce	Vývoj AML/CFT v evropských zemích: dopad geopolitického napětí ve východní Evropě

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Acronyms

AML	Anti-Money Laundering
BCBS	Basel Committee on Banking Supervision
CFT	Combating the Financing of Terrorism
EU	European Union
EUROPOL	European Union Agency for Law Enforcement Cooperation
FATF	Financial Action Task Force
FDI	Foreign Direct Investment
FIU	Financial Intelligence Unit
FSRB	FATF-Style Regional Bodies
FT	Financing of Terrorism
GDP	Gross Domestic Product
ICRG	International Co-operation Review Group
IMF	International Monetary Fund
ML	Money Laundering
MONEYVAL	Committee of Experts on the Evaluation of Anti-Money Laundering Measures and the Financing of Terrorism
OSCE	Organisation for Security and Co-operation in Europe
STR	Suspicious Transaction Report
UNHCR	United Nations High Commissioner for Refugees

Chapter 1

Introduction

Each year, an estimated 2-5% of global GDP ($800 billion to $2 trillion) is laundered through financial systems, facilitating organised crime and undermining governance. Despite the volume of over 3 million Suspicious Transaction Reports (STRs) filed in the EU in 2023, uneven reporting practices and enforcement mechanisms continue to hamper the effectiveness of Anti-Money Laundering (AML)/Combating the Financing of Terrorism (CFT) systems (UNODC 2025). These weaknesses become particularly salient in times of geopolitical crises, as the 2022 Russian invasion of Ukraine, when illicit financial activity and state-level exposure may sharply increase.

Money Laundering (ML) refers to concealing the illicit origins of proceeds derived from criminal activities, including but not limited to drug trafficking, corruption, fraud, tax evasion, and organised crime. ML aims to integrate these unlawful funds into the legitimate financial system to mask their trustworthy source, ownership, and destination. This is typically achieved through a multi-stage process involving placement, layering, and integration, which exploits the complexity and opacity of financial institutions, cross-border transactions, and legal loopholes.

Financing of Terrorism (FT) involves collecting or providing funds directly or indirectly to support terrorist acts, networks, or organisations. Unlike ML, these funds may originate from illicit or entirely legal sources (e.g., donations or business revenues), complicating detection and prevention. FT thus poses a dual threat: enabling violent extremism and undermining financial regulatory systems.

ML and FT represent persistent, multidimensional threats to global financial integrity. They weaken democratic institutions, fuel corruption, distort

markets, and facilitate transnational crime and terrorism. Their effects extend beyond the economic sphere, impeding development, exacerbating inequality, and eroding public trust in state capacity and the rule of law. In this context, a robust and adaptive AML/CFT framework[1] is essential to safeguard the integrity of financial systems and uphold the credibility of legal and institutional governance at both the national and international level.

The complexity of these phenomena has intensified with globalisation, technological innovation, and the expansion of cross-border financial infrastructure. In response, the European Union (EU) has developed a progressively integrated AML/CFT framework that began with the First Anti-Money Laundering Directive in 1991 and expanded through successive legislative packages. These efforts are informed by the recommendations of the Financial Action Task Force (FATF)[2], the global standard-setter for AML/CFT policy, as well as international best practices (EUROPOL 2021).

Despite the formal convergence of AML/CFT standards across the EU, substantial variation persists in national implementation, institutional capacity, and enforcement. Coupled with the covert nature of financial crime, this complicates empirical evaluation and policy design. At the centre of financial surveillance are STRs[3], submitted by financial institutions and other obliged entities[4] when they suspect a transaction may involve ML or FT. These are analysed by national Financial Intelligence Units (FIUs)[5] and may be referred to law enforcement.

However, an STR is not a conclusive indication of wrongdoing. It represents a subjective judgment of suspicion by a reporting institution, grounded in regulatory obligations rather than evidentiary thresholds. Many STRs arise from automated monitoring systems or conservative internal compliance practices designed to mitigate institutional liability rather than confirm criminal conduct. As such, a high volume of STRs may reflect increased vigilance, improved detection algorithms, or regulatory pressure, not necessarily a rise in underlying illicit activity. Conversely, fewer reports may indicate under-reporting,

[1] For an extended discussion about the global AML/CFT framework and EU arrangements, see Section A.2.

[2] For a extended definition of the FATF and its role in standard setting and compliance assessment, see Subsection A.1.2.

[3] For an extended definition of STR, including their legal basis, triggers, and reporting obligations, see Subsection A.1.1.

[4] A definition and typology of obliged entities is provided in Subsection A.1.5.

[5] For a definition of FIU and their legal mandate and coordination roles, see Subsection A.1.3.

institutional weakness, or regulatory indifference. This ambiguity hinders the use of STR counts as reliable indicators for policy analysis. It demands caution when using them as proxies for criminal prevalence or reporting effectiveness[6].

These limitations become especially pronounced during periods of external shock, when financial systems and reporting behaviours may respond asymmetrically depending on institutional capacity and exposure. Among recent disruptions, the 2022 Russian invasion of Ukraine stands out as a geopolitical shock with far-reaching implications for the European financial landscape. Beyond its humanitarian and security dimensions, the conflict has intensified scrutiny of cross-border financial flows, expanded sanctions enforcement, and disrupted transactional patterns across sectors. These effects will likely reverberate through national AML/CFT systems, although their exact direction and magnitude remain partly empirically untested (Sanction Scanner 2024).

This thesis investigates the determinants of STR levels across 34 EU and non-EU countries between 2012 and 2023, focusing on the impact of geopolitical tensions and macroeconomic volatility. The central research question is whether, and to what extent, external shocks, particularly the Ukraine conflict, influence financial surveillance and the operation of national AML/CFT regimes, as measured through changes in STR activity. The analysis integrates structural factors (e.g., macroeconomic and demographic indicators) and situational drivers (e.g., conflict exposure, refugee flows), employing a fixed-effects panel regression framework to isolate their effects.

While existing literature has examined how legal, institutional, and developmental factors influence STR levels, few studies systematically assess the effect of acute geopolitical crises on financial crime detection (Braun *et al.* 2016; Quirk 1997). This thesis addresses that gap by treating the Russian invasion of Ukraine as a quasi-exogenous shock, allowing for the identification of short-term changes in STR reporting that long-term trends or fixed country characteristics may otherwise obscure.

The empirical analysis draws on a newly constructed balanced panel dataset, combining annual STR counts with covariates including Gross Domestic Product (GDP) growth, unemployment, inflation, refugee flows, remittance activity, and trade dependency. Conflict-related dynamics are approximated via refugee inflows and war-related remittance patterns rather than institutional proximity to sanctioned actors. Despite harmonisation efforts, some comparability issues persist (see Chapter 4).

[6]For a detailed discussion of the non-implicatory nature of STRs, see Section 2.2.

Two primary hypotheses structure the analysis:

- **H1:** The outbreak of open conflict in Ukraine led to a significant increase in STR levels in affected and neighbouring European countries.
- **H2:** Negative macroeconomic conditions, such as weak GDP growth, rising unemployment, or elevated inflation, are associated with increased STR reporting.

These core hypotheses are supplemented by secondary inquiries into the effects of refugee flows, remittance volatility, and institutional quality on STR dynamics. The modelling approach incorporates country fixed effects to account for unobserved heterogeneity, lagged variables and log transformations to address endogeneity and skewness (see Chapter 5).

The structure of the thesis is as follows:

- **Chapter 2**: Literature Review - reviews the theoretical and empirical literature on AML/CFT frameworks, STR mechanisms, and the relationship between ML and geopolitical instability.
- **Chapter 3**: Hypotheses and Theoretical Framework - formulates the main and auxiliary hypotheses based on literature and institutional reviews.
- **Chapter 4**: Data - presents the dataset construction, sources, and harmonisation procedures, also discussing variable limitations.
- **Chapter 5**: Methodology - details the econometric approach and justifies using a chosen fixed-effects model.
- **Chapter 6**: Empirical Results - reports and interprets estimation outcomes, focusing on the responsiveness of STR activity to geopolitical shocks.
- **Chapter 7**: Conclusion - summarises findings, reflects on methodological constraints, and outlines policy and future research implications.

This thesis seeks to deepen our understanding of how national AML/CFT systems respond to acute external shocks. Analysing STR dynamics before and after the Russian invasion of Ukraine offers new insights into the adaptability and resilience of financial intelligence systems, with broader relevance for academic research and institutional design.

Chapter 2

Literature Review

This chapter reviews the literature on AML and CFT frameworks, with particular emphasis on developments, challenges, and effectiveness in Europe. Despite regulatory advances and increased academic scrutiny, significant uncertainties remain regarding the outcomes of AML/CFT regimes and the determinants of their effectiveness.

The review is structured as follows: Section 2.1 outlines the theoretical foundations and institutional evolution of AML/CFT in Europe. Section 2.2 addresses definitional and conceptual challenges of ML from both legal and economic perspectives. Section 2.3 surveys the drivers of STR, synthesising findings on crime, institutional quality, and macroeconomic factors. Section 2.4 examines the role of geopolitical shocks, especially recent Eastern European tensions, in shaping financial crime and STR trends, highlighting gaps in current research. Section 2.5 summarises the key findings and motivates the empirical approach adopted in this thesis. Further clarifications are provided in Appendix A.

2.1 Theoretical Background of AML/CFT in Europe

The evolution of AML and CFT frameworks in Europe has spanned several decades, marked by progressive international conventions and regulatory harmonisation. The modern AML regime emerged in the 1980s, primarily in response to drug trafficking, culminating in the 1988 Vienna Convention[1], which

[1]The United Nations Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, 1988.

first defined and criminalised ML at the international level. The Convention in UNODC (1988) articulated ML as 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"*

The establishment of the FATF in 1989 by the G7[2] expanded the scope of AML through the issuance of its Forty Recommendations in 1990, which were subsequently revised (notably in 2003 and 2012) to encompass a wider range of predicate offences and to set the global benchmark for AML/CFT standards (FATF 2025d). Following 2001, the international framework broadened further to include CFT, proliferation financing[3], and targeted sanctions.

In Europe, the regulatory framework was formalised with the EU's first Anti-Money Laundering Directive (91/308/EEC)[4], inspired by both the Vienna Convention and FATF standards. Subsequent directives progressively expanded the range of predicate offences, incorporated the non-bank financial sector, introduced the risk-based approach, and tightened customer due diligence requirements. The 4th and 5th Directives addressed issues such as virtual assets and beneficial ownership transparency, while the 6th Directive focused on the harmonised criminalisation of ML (European Parliament and Council 2015).

Institutional structures have developed in parallel: each EU Member State maintains a national FIU to receive and analyse STRs, with extensive cooperation fostered through the Egmont Group[5], FIU.NET[6], and support from agencies like EUROPOL[7]. The Council of Europe's MONEYVAL committee oversees compliance in non-EU and Eastern European countries, promoting convergence with international standards.

By the 2010s, Europe had established a comprehensive, multi-layered regulatory AML/CFT system anchored in robust legislation, national regulatory

[2]The Group of Seven (G7) is an intergovernmental organisation of advanced economies.

[3]Proliferation financing refers to funding activities linked to weapons of mass destruction.

[4]Directive 91/308/EEC, adopted in 1991, established initial EU measures against money laundering.

[5]The Egmont Group is an international network facilitating FIU cooperation.

[6]FIU.NET was a decentralised computer network connecting FIUs across the EU, enabling secure exchange of suspicious transaction data. It operated until 2016, when its functions were gradually integrated into EUROPOL infrastructure.

[7]European Union Agency for Law Enforcement Cooperation (EUROPOL) supports EU member states in preventing and combating serious international crime and terrorism, including through intelligence coordination and technical assistance.

bodies, and transnational cooperation. This foundation has enabled European financial systems to respond adaptively to new threats, including those arising from geopolitical tensions and conflicts.

2.2 The Problem of Money Laundering and STRs

Money Laundering (ML) denotes the process of making illegally obtained funds appear legitimate, typically by concealing the criminal origin of assets derived from activities such as drug trafficking, fraud, or organised crime (UNODC 2025). This process unfolds in three stages: placement (introducing illicit funds into the financial system), layering (obscuring the audit trail through complex transactions), and integration (re-entering the economy as ostensibly lawful assets).

Effective AML regimes seek to disrupt laundering at any stage. Central to detection are the well-defined parameters and identification criteria that enable obliged entities[8] to recognise and report potentially illicit activity to the national FIU through STRs. In some jurisdictions, the term SAR is used interchangeably. As noted by Braun *et al.* (2016), STRs are vital to the AML/CFT framework, providing intelligence for regulatory and law enforcement investigations. The effectiveness of detection thus relies on robust internal monitoring processes and the precision of the criteria used to identify suspicious transactions.

Such illicit flows have serious socio-economic implications, as they facilitate and reward predicate offences (e.g., corruption, drug trafficking), undermine financial system integrity, distort markets, and may even enable criminal infiltration of legitimate business sectors. The social harms are substantial, perpetuating underlying crimes and damaging communities.

Unchecked, large-scale ML also poses security risks, including the facilitation of FT and the erosion of governance through corruption. As OECD (2014) highlights, combating ML is both a matter of technical compliance and an ethical imperative, particularly for developing countries experiencing capital flight and resource depletion.

Although STRs are central to financial surveillance, their interpretation remains contested. As noted by Levi (2002), STRs reflect subjective suspicion shaped by organisational culture, legal thresholds, and risk aversion. Practices

[8]For an extended definition of obliged entity, see Subsection A.1.5 in Appendix.

such as defensive reporting, where reports are submitted primarily to avoid liability rather than based on concrete suspicion, can inflate the volume of low-quality submissions. Cross-country differences in STR rates typically reflect institutional practices more than actual ML prevalence. This thesis thus treats STRs as indicators of surveillance intensity, not direct evidence of financial crime.

2.3 Existing Research on Drivers of STR Levels

The literature identifies several determinants behind cross-country and temporal variation in STR filings. These factors are typically grouped as follows:

- Crime and predicate-offence factors
- Enforcement and institutional quality
- Macroeconomic and structural variables

Prior research details the influence of crime rates, regulatory effectiveness, and economic context on STR volumes. More recently, scholars have highlighted challenges arising from financial innovation, such as mobile money, for AML/CFT compliance. However, there is a notable gap in the literature concerning the effects of acute geopolitical shocks on STR trends. Existing work generally emphasises stable or long-term drivers, rather than the impact of sudden external crises, a gap this thesis seeks to empirically address.

2.3.1 Crime-Specific and Predicate Offence Factors

While STRs do not directly quantify criminal activity, their frequency often signals exposure to predicate offences that generate illicit proceeds. Jurisdictions facing elevated levels of organised crime, terrorism, or economic crimes typically report more STRs, although this association depends on institutional capacity, legal scope, and reporting culture. Braun *et al.* (2016) documents a positive correlation between STR volumes and levels of organised crime and terrorism, indicating that increased exposure to illicit financial flows raises the likelihood of transactions being flagged as suspicious.

An important moderating factor is the breadth of predicate offences defined in national legislation. Jurisdictions that criminalise a wide array of activities,

including tax evasion, cybercrime, and environmental offences, compel reporting entities to monitor a broader spectrum of transactions. Braun *et al.* (2016) shows that jurisdictions with more comprehensive legal definitions tend to generate higher volumes of STRs. Where legal coverage is narrow or outdated, some suspicious behaviour may go undetected, limiting the diagnostic value of STR data.

National risk typologies further affect reporting patterns. Countries with international financial centres are more likely to detect flows related to foreign corruption or transnational fraud, while those with large informal economies may observe higher reporting tied to cash-based sectors or remittance corridors. Gaspareniene *et al.* (2022) illustrates this variation through cluster analysis, revealing distinct cross-country profiles of money laundering risk.

Another concern is "defensive reporting": the excessive submission of low-quality or low-relevance STRs to ensure compliance. As noted by Takats (2009), such practices can distort resource allocation and impair the analytical capacity of FIUs, weakening the overall effectiveness of financial intelligence systems.

Although enforcement-related factors are addressed in subsequent sections, the literature remains scarce on the impact of conflict-driven crimes, such as sanctions evasion or arms trafficking, on STR activity. Geopolitical crises may alter transaction typologies and increase opacity, but empirical evidence remains limited. This thesis contributes to addressing this gap by analysing STR responses to geopolitical shocks in Eastern Europe.

2.3.2 Enforcement and Institutional Factors

The quality and volume of STR reporting are strongly influenced by the enforcement of AML/CFT regulations and the effectiveness of responsible institutions. Well-developed legal and institutional frameworks are linked to more robust detection and reporting of suspicious transactions (Braun *et al.* 2016). Stringent compliance regimes and active supervision tend to increase (and enhance) STR outputs; however, overly harsh penalties or ambiguous guidance may prompt defensive, low-quality reporting, while insufficient training leads to under-recognition or over-recognition of suspicious activity (Braun *et al.* 2016).

The capacity and mandate of the FIU are also decisive. Comparative studies show considerable variation across Europe in FIU proactivity, analysis quality, and feedback to reporters (Lagerwaard 2018). Well-resourced and proactive

FIUs tend to incentivise higher-quality and more thorough reporting, whereas under-resourced FIUs may struggle with backlogs and less effective engagement.

Institutional awareness of rigorous FIU oversight can promote more diligent filings by financial institutions. External factors such as international evaluations (FATF, MONEYVAL) or major scandals also induce short-term spikes in STR filings as institutions respond to critiques and aim to demonstrate compliance (Braun *et al.* 2016). However, over-bureaucratic or punitive procedures may paradoxically discourage genuine detection, turning compliance into a formalistic exercise (Roule & Kinsell 2003).

Variability in enforcement is especially salient between Western and Eastern Europe. Many Eastern European states have reformed AML frameworks to meet EU or global standards, but implementation and practical capacity often lag. For instance, while Ukraine made rapid legal and analytical advances post-2014, overall effectiveness, especially regarding corruption, remained below that of most EU countries (Tykhonova *et al.* 2020). This underscores the importance of not only legislative change, but also institutional capacity (FIUs, law enforcement, judiciary) for meaningful AML/CFT enforcement.

In countries with persistent corruption or weak legal frameworks, STR reporting often falls short of expectations, reflecting higher underlying risk and enforcement deficits. Conversely, nations investing in financial supervision and crime enforcement tend to produce more reliable and comprehensive suspicious reporting.

2.3.3 Macroeconomic and Structural Factors

Macroeconomic conditions and structural features of an economy are key determinants of STR levels. The overall size of the financial sector and the volume of economic transactions, often larger in advanced or banking-oriented economies, naturally yield more reportable activities. Nevertheless, discrepancies arise when scaling by population or GDP, especially in jurisdictions hosting major offshore or private banking sectors, where STR counts are inflated by non-resident client activity. Eurostat has documented substantial per Capita variation in STR volumes across Europe, closely linked to the prevalence of financial services in specific small states (Anti-Money Laundering Portal 2024).

The shadow economy[9] also impacts ML risk. Estimates place shadow econo-

[9]Comprising unreported, often cash-based activities outside official statistics, mainly for tax evasion or regulatory avoidance.

mies in some Eastern European countries above 20-30% of country GDP (Buehn *et al.* 2010), reflecting significant flows of funds in need of laundering. In such settings, more frequent cash smuggling and untraceable transactions may increase the risk of ML. However, the resulting STR statistics do not necessarily provide a direct or reliable measure of actual illicit activity. The reliability of STR data ultimately depends on the effectiveness and credibility of the underlying identification processes within reporting institutions. In contexts where large volumes of illicit funds remain outside the formal financial sector, or where internal controls are weak, STR rates may be artificially low or may not accurately capture the true scale of predicate crime. Thus, while a large shadow economy indicates elevated predicate crime risk, it also underscores the need to assess the quality of detection processes before drawing inferences from observed STR levels.

Structural factors, including dominant industries, shape reporting patterns. Countries with significant gambling or real estate sectors, for example, may see more sector-specific STR activity, especially following EU directives extending reporting obligations to high-value transactions in these fields. Cluster analysis by Gaspareniene *et al.* (2022) shows that robust anti-money laundering performance is associated with lower corruption, a strong regulatory framework, and high rates of STR. In effect, improved governance correlates with reduced ML risk and enhanced STR detection.

The business cycle and exogenous shocks are also important. Economic downturns typically increase financial stress, which can incentivise illicit schemes and opportunistic crime (White & Case LLP 2022). Major events, such as the global financial crisis and the COVID-19 pandemic, have coincided with surges in fraud and misappropriation, reflected in increased STR filings, particularly in sectors affected by emergency government aid.

While direct academic evidence on macroeconomic cycles and STR volumes remains limited, plausible mechanisms suggest that contractions in output, falling tax revenues, and shifting enforcement priorities can all alter the volume and nature of STR. Fluctuations in STR during economic cycles may also be complicated by simultaneous legal or regulatory reforms.

In summary, macroeconomic and structural characteristics, including financial sector size, shadow economy prevalence, governance quality, and cyclical shocks, are all crucial for understanding cross-country variation in STR patterns. However, little research has examined the specific role of acute geopolitical events in driving reporting dynamics. The following sections will address

this gap by focusing on conflict-driven shocks and their impact on financial crime detection.

2.4 The Impact of Geopolitical Events on Financial Crime and STRs

Geopolitical shocks, including wars, armed conflicts, and major international crises, create conditions that can foster illicit financial flows. Such events often precipitate predicate crimes and simultaneously undermine established detection and enforcement mechanisms. This section surveys the literature linking geopolitical events to ML/FT, with particular attention to Eastern Europe. Foundational works such as Quirk (1997) and Tykhonova *et al.* (2020) demonstrate that conflicts can generate new opportunities for financial crime and impede oversight. These disruptions are likely to be reflected in fluctuations in STR data, providing a measurable indicator of financial system vulnerability during periods of geopolitical tension.

2.4.1 Geopolitical Shocks and Financial Crime: Existing Evidence

Direct scholarly research explicitly linking war or conflict to ML remains limited, marking a significant gap in the literature. Nevertheless, both historical and contemporary evidence suggest that conflicts tend to foster increased illicit financial activity. Conflict environments typically weaken law enforcement and regulatory oversight, creating conditions that facilitate undetected fund movements by criminal organisations. For example, the Russian invasion of Ukraine in 2022 led authorities to warn of heightened ML and FT risks, as criminal actors exploited the turmoil, humanitarian aid channels, and cross-border fund flows, often circumventing sanctions and controls (European Commission 2022).

The FATF has similarly warned that such crises can accelerate the misuse of financial innovations, such as cryptocurrencies, to bypass established controls. Earlier episodes, such as the Balkan conflicts in the 1990s and Middle Eastern wars in the 2000s, also saw widespread smuggling and black-market activity, generating illicit profits in need of laundering. However, these links are documented primarily in investigative or institutional reports, with little direct academic analysis based on STR statistics.

Geopolitical crises frequently coincide with surges in organised crime and illicit trade. As noted by Quirk (1997), political upheaval can trigger capital flight and significant increases in ML, exemplified by the post-Soviet outflows from Russia to Western Europe. Such episodes illustrate how large-scale illicit flows, driven by instability, can have macroeconomic effects, including exchange rate volatility and reduced economic stability.

More recent analyses, such as Tykhonova *et al.* (2020), explore economic crime in Ukraine and the EU, highlighting persistent corruption and fraud issues likely exacerbated in times of conflict when oversight diminishes. While Ukraine has reformed its legal and institutional frameworks in response to these threats, the direct effect of conflict on STR data remains under-examined.

Additionally, literature on FT highlights the use of informal value transfer systems (e.g., hawala[10]), cash smuggling, and trade-based laundering in war zones. The mass displacement caused by conflict, such as refugee flows from Ukraine, introduces further opportunities for abuse, including illicit fund transfers masked as remittances or humanitarian aid (Sanction Scanner 2024).

In summary, the evidence suggests that geopolitical shocks, particularly wars, foster environments conducive to ML and related crimes. However, rigorous empirical research linking these shocks to changes in STRs is scarce. This thesis addresses this gap by empirically testing the hypothesis that the Russia-Ukraine conflict has significantly influenced STR patterns in Europe.

2.4.2 Economic Shocks and STRs

Geopolitical events, notably war, can trigger economic shocks and social upheaval, influencing patterns of financial crime and their detection. Several theoretical mechanisms may link major shocks to fluctuations in STRs:

- **Increase in Predicate Crimes and Illicit Flows:** Conflict and sanctions generate or intensify predicate offences such as sanctions evasion, arms trafficking, and aid embezzlement. Resulting illicit proceeds require concealment, often producing transactions flagged as suspicious. Wartime instability also encourages recourse to informal or shadow economies, with spillovers into the formal sector detectable by STR filings.

[10]Hawala is an informal value transfer system based on the performance and honour of a network of money brokers, primarily used in the Middle East, North Africa, and South Asia.

- **Displacement and Capital Flight:** Armed conflict often prompts sudden movement of people and assets. Large, irregular transfers such as capital flight or sanctions-targeted wealth reallocation may prompt STRs. Conversely, some actors may bypass formal banking, using cash couriers or crypto-assets, escaping detection.

- **Strain on Controls and Compliance:** Upheaval can overwhelm financial institutions and regulators, reducing capacity for detailed monitoring. Emergency measures may inadvertently ease compliance requirements. However, certain risks, such as sanctions evasion, become more prominent, prompting intensified screening and increased STR filings.

- **Economic Downturn and Financial Pressure:** Economic crises often accompany geopolitical shocks, raising incentives for financial crime. Firms and individuals under stress may engage in fraud, tax evasion, or illicit transfers, historically linked to higher STR volumes. Distinguishing the effects of conflict from broader economic conditions remains empirically challenging.

Given these mechanisms, it is hypothesised that the Ukraine conflict led to a rise in STR filings across Europe, especially in directly or financially exposed countries. It is further hypothesised that economic downturns triggered by the crisis independently drive STR increases, complicating the separation of conflict-specific and economic effects.

Theoretical literature underscores the adaptability of illicit finance in crisis contexts. Organised crime groups exploit new opportunities and regulatory gaps during conflict (UNU-CPR 2024). The Ukraine war has highlighted the dual use of crypto-assets for both legitimate and illicit purposes. Consequently, FIUs have issued updated guidance on typologies linked to sanctions evasion and misuse of charities, prompting new forms of suspicious activity reporting.

In summary, a central geopolitical crisis can significantly alter both the incidence and typology of financial crime, challenging the effectiveness of existing controls. The empirical analysis in this thesis will assess the net impact of the Ukraine conflict and associated economic shocks on STR trends and reporting practices.

2.5 Identification of Research Gap

The literature establishes that AML/CFT effectiveness is shaped by factors such as crime rates, legal definitions, institutional quality, and economic context. While robust enforcement and rising criminality are linked to higher STR filings, weak institutions and corruption can suppress reporting. However, a key gap remains: existing research rarely addresses the immediate effects of geopolitical shocks, such as armed conflict, on AML/CFT outcomes. Most prior work examines stable settings or long-term trends, leaving the impact of sudden crises underexplored.

The war in Ukraine and its influence in Eastern Europe create a unique opportunity to fill this gap. There is theoretical support for the idea that conflicts amplify illicit financial flows and reshape the behaviour of reporting entities, but these effects have not yet been empirically quantified. This thesis addresses the lacuna by analysing STR data from European countries before and after the outbreak of war, thereby operationalising and extending arguments from earlier studies Quirk (1997); Tykhonova *et al.* (2020).

For example, Quirk's hypothesis that destabilising events trigger surges in illicit flows will be tested against observed STR patterns. Furthermore, this thesis builds on the work of Tykhonova *et al.* (2020) by contextualising the institutional vulnerabilities identified in Ukraine within a broader European framework. While it does not directly assess institutional differences, the analysis incorporates control variables for governance quality to account for cross-country variation in reporting capacity.

In summary, while prior literature explains macro, institutional, and economic drivers of STR, it does not systematically examine the impact of acute geopolitical shocks. By analysing AML/CFT system behaviour during both stable periods and those characterised by major geopolitical events, this thesis aims to elucidate how such frameworks respond to external pressures, thereby contributing new insights into policy adaptation and institutional resilience in times of crisis.

Chapter 3

Hypotheses and Theoretical Framework

3.1 Hypothesis Development

This chapter formulates hypotheses regarding the determinants of STR levels across European countries, focusing on the effects of geopolitical shocks and economic stress from 2010 to 2023. Building on the theoretical framework in Chapter 2, it synthesises relevant literature to develop testable propositions suited to this analysis. Each hypothesis is discussed in a dedicated subsection, concerning academic and institutional sources.

Hypothesis 1 The open conflict in Ukraine increased the levels of STRs in the European zone.

The outbreak of open conflict in Ukraine in 2022 is expected to have heightened money laundering and other illicit financial activities, and thus may increase STR levels across Europe. Wars and sanctions can create a "permissive environment" for illegal finance, as oversight is disrupted and criminals exploit chaos. For example, an EU review noted that the Ukrainian conflict and associated sanctions risks have enabled criminals to exploit weakened financial controls and move funds across borders. Market intelligence and AML practitioners report that war-related flows (including humanitarian aid, remittances, and bulk cash movements) can be manipulated by illicit actors. In particular, the opacity of alternative channels (such as cryptocurrencies or informal networks) may surge during conflict (Sanction Scanner 2024).

By economic logic, the stress on banks and regulators during wartime, combined with urgent capital movements, likely generates more unusual transactions flagged by banks. In summary, both theory and practitioner reports suggest a positive association between the Ukrainian conflict and STRs.

Hypothesis 2 Negative economic performance (e.g., rising unemployment, reduced GDP growth rates, rising inflation) increases STR levels.

Economic hardship is theorised to drive crime and thus suspicious flows. Standard economic models of crime suggest that when legitimate opportunities dwindle, individuals and firms may turn to illicit schemes (Becker 1968). Historical evidence and expert commentary confirm this pattern. Transparency International has warned that "corruption often thrives in times of crisis, particularly when institutions and oversight are weak," and the UK's National Crime Agency labelled corruption "recession-proof" (White & Case LLP 2022). Financial crimes such as fraud, bribery, and money laundering tend to rise during recessions, as businesses under pressure may cut corners or exploit government relief funds. Analyses of past downturns (e.g., the 2008-9 crisis) show marked increases in white-collar crime prosecutions and fraud cases.

Deteriorating macroeconomic performance (higher unemployment, lower GDP growth) should therefore raise STR filings. Institutional surveys and AML reviews routinely identify weak economic conditions as a factor that intensifies financial crime risks. Accordingly, this hypothesis posits that adverse economic shocks (rising unemployment, falling output, etc.) increase STR levels in the European zone.

Hypothesis 3 Received remittances increase STR levels.

Large incoming remittance flows can amplify ML vulnerabilities, triggering more STRs. Remittance channels are, by design, high-volume and often lightly regulated, making them attractive for the concealment of illicit funds. The GAO (2016)[1] reports that remittances pose significant ML risks because criminal proceeds can hide amid genuine transfers, fraudsters may use structuring

[1]The U.S. Government Accountability Office (GAO) is an independent, nonpartisan agency that supports the U.S. Congress by auditing, evaluating, and investigating federal government activities to promote accountability and transparency in the use of public resources.

(splitting transfers) or corrupt agencies to move drug or human-smuggling proceeds. Stakeholders interviewed by the GAO specifically noted that remittance services can be exploited to launder proceeds from various crimes, including drug trafficking and organised crime (GAO 2016). A case study of Mexico highlights this vulnerability: one analysis found that sudden remittance surges could partly reflect "criminal groups that use remittances to launder money" (Sanchez-Rodriguez 2023).

When a country receives more remittances, reporting entities see more cross-border flows, raising the probability of encountering dubious transactions. In summary, policy reports and country studies indicate that higher remittance inflows correlate with greater STR activity, as illicit funds may be disguised as remittances, supporting this hypothesis.

Hypothesis 4 Paid remittances decrease STR levels.

Conversely, substantial outflows of remittances (paid by residents to non-residents) may reduce domestic suspicious activity. Outward remittances represent legitimate transfers of earned income or aid, and they remove liquidity from the local financial system. In many economies, substantial remittance outflows indicate robust diaspora support: these funds often finance education, investment, and consumption in the origin countries. For instance, one study shows that a 25% increase in remittance purchasing power led recipients to boost education spending by 13% and cut the poverty rate by 17% (NBER 2025). This suggests remittances raise legitimate economic activity and reduce financial stress at home. By analogy, if a country pays out more remittances, its domestic economy may enjoy higher living standards and lower poverty, which can diminish incentives for financial crime.

While no direct studies exist on remittance outflows and STRs, economic reasoning supports the hypothesis that greater paid remittances (net outflows) correspond to fewer domestic suspicious transactions. In other words, this hypothesis posits a negative relationship between remittances paid and STR levels, reflecting the stabilising effect of outward transfers (NBER 2025).

Hypothesis 5 Higher inflation is associated with more STRs.

High inflation is theorised to raise STR levels by creating financial instability that criminals exploit. Rapid price increases often coincide with loose monetary

policy or currency volatility, which can weaken banking discipline. For example, recent research finds that higher deposit interest rates (frequently used to combat inflation) are associated with increased money laundering risk (Ngo 2025). High interest rates and inflation can induce capital flight and speculative trading, providing cover for laundering. In practice, banks may face more demand for high-interest deposit schemes and risky financial products, and some clients may overuse cash to preserve value.

These conditions can generate more suspicious activity alerts. Thus, consistent with monetary theory, this hypothesis posits that higher inflation (and its attendant interest-rate effects) is associated with more STRs (Ngo 2025).

Hypothesis 6 Higher numbers of war refugees increase STR levels.

The arrival of war refugees is hypothesised to have contributed to increased STR filings across Europe. Large-scale population movements, such as those from the war in Ukraine, create opportunities for legitimate and illicit financial flows, complicating detection and straining institutional capacity. These influxes can challenge due diligence, making distinguishing between lawful remittances and suspicious transactions harder. Organised crime may exploit these conditions through identity fraud, human trafficking, and irregular remittance patterns.

FATF (2022) identifies refugee flows as high-risk for ML and FT, requiring greater vigilance by financial institutions. Empirical studies show that rising refugee populations are linked to higher financial crime rates (Akbulut-Yuksel *et al.* 2022). Financial intelligence units and international organisations have also reported increased STR submissions during substantial refugee movements, reflecting greater volume and complexity of financial activity.

Overall, academic and institutional evidence indicate that surges in refugee populations, increasing transaction volume and complexity, can lead to higher STR levels.

The above hypotheses are grounded in theoretical expectations and supported by academic literature and institutional analyses. Together, they establish a conceptual framework for understanding the complex drivers of STR levels across European countries during economic and geopolitical stress periods.

Chapter 4

Data

The current chapter provides a systematic and comprehensive overview of the dataset employed in the empirical analysis. The data workflow encompasses all stages: collection, cleansing, variable selection and preparation. Key steps undertaken to ensure the comparability and transparency of the data are highlighted, with particular attention given to the challenges associated with the standardisation of measurements and the management of missing or inconsistent data entries.

The Section 4.1 provides a comprehensive overview of the underlying sources, definitions, and the variables' alignment in constructing a balanced data panel. The complete list of variables and their descriptions is summarised in Table 4.1. This data panel encompasses the EU and neighbouring states from the year 2012 to the year 2023. Subsequent Section 4.2 of this chapter presents descriptive statistics and justifies variable selection. The Section 4.3 addresses key diagnostics such as multicollinearity, variability, and stationarity. Combining these steps ensures that the analytical dataset is robust and methodologically rigorous.

4.1 Data Collection and Variable Definitions

The following section delineates the construction of the analytical dataset, including the sources, definitions, limitations, and methodological decisions for each variable. This study aims to establish a framework for conducting robust and transparent cross-country comparisons of the possible determinants of STR in the EU and neighbouring countries. The selection of variables and

the hypothesised effects were motivated by the literature review (Chapter 2), and formalised in the research hypotheses (Chapter 3).

A primary challenge is the lack of uniformity in national legislation, data collection practices, and reporting standards, particularly between EU and non-EU countries and within individual countries over the observed period. Despite extensive efforts to harmonise data, these differences inevitably constrain the degree of comparability that can be achieved.

The outcome variable, annual STR counts, was manually compiled from national FIU reports. In certain countries where only SARs[1] were documented, the series was standardised to ensure within-country consistency in reporting methods over time. The methodology remains susceptible to challenges arising from periodic changes in definitions or thresholds, which may result in visible discontinuities in the STR data within a country over the study period.[2]

When data were missing or anomalous, efforts were made to address these gaps using official or reputable third-party sources.[3] Individual missing values for each country, for which no third-party solution was available, were imputed using linear interpolation as recommended by Lepot *et al.* (2017), to preserve the panel's temporal continuity and internal structure.[4,5] In the cases of Moldova (2018), Finland (2021), and the United Kingdom (2021), it was necessary to impute unusually high STR values. Linear interpolation between adjacent years was applied at the country level to address these suspected data anomalies.

The following subsections document each variable's sources and methodological development, providing further detail on how data limitations were addressed.

[1]Suspicious Activity Reports (SARs) are formal notifications submitted by financial institutions to authorities regarding transactions or behaviours that may indicate money laundering, terrorist financing, or other financial crimes.

[2]The analysis is based exclusively on the initial submission date of a STR to the FIU. Subsequent procedural steps can require several years, including further analysis, referral to executive authorities, and initiating and resolving investigations and prosecutions. Restricting the analysis to the date of initial reporting ensures that outcome and explanatory variables are measured contemporaneously, thereby minimising the risk of temporal mismatch and time-lag bias. For more information, see Section 2.2.

[3]In instances where the United Nations High Commissioner for Refugees (UNHCR) reported combined data for "Serbia and Kosovo," the figures were proportionally split based on the population shares of the respective countries.

[4]The following country-year pairs had 13 missing records for the Basel AML Index: Bulgaria (2021), Germany (2021), Estonia (2021, 2022), France (2021), Croatia (2021), Luxembourg (2021, 2022), North Macedonia (2021, 2022), Netherlands (2021), Poland (2021), and Romania (2021, 2022).

[5]One record for STR was missing in Croatia (2023).

Suspicious Transaction Reports (str)

The annual numbers of STRs, submitted by obliged entities[6] to the national FIU, were primarily obtained from official reports published by the respective FIUs, typically accessible via their websites[7], or those of local Ministries of Finance or police departments. Where such data were unavailable, STR figures were supplemented using information from FATF Mutual Evaluation Reports (2025), comparative analyses by Lagerwaard (2018) and EUROPOL (2021), or through direct email correspondence with the relevant FIU authorities.

Population (pop)

The annual numbers of total population per country were obtained from the World Bank's database (series code: SP.POP.TOTL)[8]. Population data are used to scale variables and compute per Capita measures. Countries with larger populations (generally larger economies) tend to exhibit higher absolute values across variables. Using the population variable, we derive per Capita metrics (such as *refugees per Capita* and *net migration per Capita*) to facilitate cross-country comparisons that account for country size differences and adjust the *paid remittance* measure.

Unemployment (unemp)

Information on annual unemployment rates for each country was sourced from the World Bank's database (series code: SL.UEM.TOTL.NE.ZS)[8]. These rates are compiled based on national labour force surveys and are internationally standardised by the International Labour Organisation to ensure comparability across countries and over time. Incorporating unemployment as a variable allows for assessing how changes in labour market conditions may relate to key outcomes such as STRs and migration flows.

Net Migration (n_mig)

Annual net migration per Capita data for each country were obtained from the World Bank database (series code: SM.POP.NETM)[8]. Based on United Nations Population Division data, net migration is defined as the number of

[6] For further details, see Subsection A.1.5.

[7] A complete list of FIUs and their contact information is provided by the Egmont Group website (2025).

[8] For further information, please refer to WB databank (2025).

immigrants minus the number of emigrants, including citizens and non-citizens. The original variable is reported as the total number of migrants per country. To enable meaningful cross-country comparisons, the variable was standardised by each country's population, thereby capturing migratory intensity relative to country size. This variable controls broader population movements associated with general migration trends, rather than war-induced refugee flows, which may also affect financial flows and the number of reports analysed in this study.

GDP per Capita (gdp)

Annual GDP per Capita in US dollars was obtained from the World Bank's database (series code: NY.GDP.PCAP.CD)[9]. This variable tests whether a country's economic size is a determinant of STR levels, as suggested by Braun *et al.* (2016). A higher GDP per Capita may reflect a larger volume of financial transactions, which could, in turn, increase the likelihood of reporting suspicious transactions. Additionally, GDP per Capita (together with population) was used to convert *paid remittance* values into a percentage of GDP, allowing for meaningful cross-country comparisons.

Inflation (inf)

Annual inflation rates, measured as the percentage change in the consumer price index (CPI), were obtained from the World Bank's database (series code: FP.CPI.TOTL.ZG)[9]. This internationally standardised indicator represents the annual percentage change in consumer prices, measured as the cost to a typical household of acquiring a representative basket of goods and services. The dataset provides a harmonised measure of inflation across countries and years, enabling reliable cross-country and temporal comparisons of price stability, independent of national differences in inflation calculation methods.

Foreign Direct Investment (fdi)

Annual net inflows of Foreign Direct Investment (FDI) expressed as a percentage of GDP were obtained from the World Bank's World database (series code: BX.KLT.DINV.WD.GD.ZS)[9]. This indicator captures the net investment by foreign entities aiming to acquire a lasting management interest (at least 10% of voting stock) in domestic enterprises, as compiled from balance of payments

[9]For further information, please refer to WB databank (2025).

statistics and supplemented by estimates from international organisations. Including FDI as a control variable helps account for global capital movements' influence, which may reflect and affect economic and geopolitical conditions relevant to financial crime risks. Moreover, fluctuations in FDI can serve as an indicator of the underlying economic performance of the country.

Received personal remittances (r_rem)

Annual personal remittances received as a percentage of GDP were sourced from the World Bank's database (series code: BX.TRF.PWKR.DT.GD.ZS)[10]. This indicator, compiled from International Monetary Fund (IMF) balance of payments statistics, captures the sum of personal transfers and compensation of employees received by resident households from non-resident individuals or foreign employers. Measuring the scale of remittance inflows is essential for understanding the role of cross-border personal finance flows in a country's economy. Including this variable allows us to examine whether countries with higher incoming remittances exhibit different patterns in STR, given that remittance channels may sometimes be exploited for illicit transfers, are sensitive to economic or geopolitical shocks, or can mask suspicious activity due to high transaction volumes.

Paid Personal Remittances (p_rem)

Annual personal remittances paid as a percentage of GDP were sourced from the World Bank's database (series code: BM.TRF.PWKR.CD.DT)[10]. This indicator, compiled from IMF balance of payments statistics, captures the sum of personal transfers and compensation of employees sent by resident households to non-resident individuals or foreign employers. The original variable is reported in US dollars; for meaningful analysis, we converted it to a percentage of GDP to facilitate comparability across countries and over time. Including *paid remittances* as a variable allows us to assess the role of outbound personal transfers, which may be influenced by migration patterns, economic shocks, or the presence of foreign worker communities, and may also affect the pattern or detection of STR.

[10]For further information, please refer to WB databank (2025).

Control of Corruption (c_corr)

Control of Corruption is an aggregate governance index from the World Bank's database of indicators (series code: CC.EST)[10]. It measures perceptions of the extent to which public power is exercised for private gain, encompassing petty and grand forms of corruption and state capture by elites and private interests. The index is standardised on a scale from approximately -2.5 (weak control) to 2.5 (strong control), with higher values indicating lower perceived corruption. Based on expert and survey-based assessments from a wide range of international sources, this indicator enables cross-country and temporal comparisons of institutional quality. This variable is included to capture differences in institutional quality, as higher levels of corruption may either increase illicit activity or suppress reporting of suspicious transactions. At the same time, stronger control could reflect more robust AML enforcement.

Government Effectiveness (g_eff)

Government Effectiveness is an aggregate governance index from the World Bank's database of indicators (series code: GE.EST)[11]. It measures perceptions of the quality of public services, the competence and independence of the civil service, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies. The index is standardised on a scale from approximately -2.5 (weak effectiveness) to 2.5 (strong effectiveness), with higher values indicating better outcomes. Based on expert and survey-based assessments from various international sources, this indicator enables cross-country and temporal comparisons of government performance. This variable is included to account for differences in administrative capacity, as more effective governments may enforce AML/CFT regulations more rigorously and support more robust suspicious transaction reporting systems.

Rule of Law (rof)

Rule of Law is an aggregate governance index from the World Bank's database of indicators (series code: RL.EST)[11]. It measures perceptions of the extent to which agents have confidence in and abide by the rules of society, particularly the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence. The index is standardised on a

[11]For further information, please refer to WB databank (2025).

scale from approximately −2.5 (weak rule of law) to 2.5 (strong rule of law), with higher values indicating stronger rule of law. Based on expert and survey-based assessments from a wide range of international sources, this indicator enables cross-country and temporal comparisons of institutional strength. This variable is included to capture differences in the legal environment, as a stronger rule of law is expected to facilitate more effective final detection and reporting of suspicious transactions.

Political Stability and Absence of Violence/Terrorism (ps_avt)

Political Stability and Absence of Violence/Terrorism is an aggregate index from the World Bank's database of indicators (series code: PV.EST)[12]. It measures perceptions of the likelihood that a government will be destabilised or overthrown by unconstitutional or violent means, including politically motivated violence and terrorism. The index is standardised on a scale from approximately −2.5 (low stability) to 2.5 (high stability), with higher values indicating greater political stability. This variable is particularly relevant in Eastern European geopolitical tensions, as domestic instability may affect financial crime risks and reporting patterns.

War Refugees (w_ref)

The War Refugees variable measures the number of refugees and asylum-seekers per Capita from Ukraine, Belarus, and Russia received by each European country. These countries were selected as primary sources of displacement linked to recent geopolitical tensions and armed conflict in Eastern Europe, notably the war in Ukraine (Guichard *et al.* 2022). Data come from the UNHCR[13], which compiles national statistics using standardised definitions and verification procedures to ensure cross-country and temporal consistency. The variable was initially reported as total persons and was adjusted to a per capita rate to capture the relative scale of inflows per host country.

This measure can potentially control exogenous population movements directly related to regional conflict, in contrast to the net migration variable, which captures broader migratory flows regardless of cause. Together, these variables enable a more accurate assessment of how conflict-driven displace-

[12]For further information, please refer to WB databank (2025).

[13]For further information and methodological details, see UNHCR Statistics Database (2025).

ment and general migration influence financial flows, economic conditions, and the reporting of suspicious transactions.

Basel AML Index (b_ind)

The Basel AML Index, published by the Basel Institute on Governance[14], is a composite score (ranging from 0, indicating the lowest risk, to 10, indicating the highest risk) reflecting each country's risk of ML and FT. The index aggregates 18 indicators spanning domains such as the quality of AML/CFT frameworks, corruption and bribery, financial transparency and standards, public accountability, and legal and political risks, drawing on data from international sources including the FATF and the World Bank.

This variable is an independent measure of a country's overall effectiveness and vulnerability in AML and CFT efforts. While distinct from the governance indicators described above, the index may correlate with them and is included to capture specific AML vulnerabilities that could influence the country's patterns of STR. Its inclusion thus allows for a more comprehensive assessment of national risk environments and regulatory quality in the context of financial crime analysis.

Global Pandemic of COVID-19 (covid)

A dummy variable captures the impact of the COVID-19 pandemic, assigned a value of 1 for years classified as a global pandemic (2021, 2022, 2023) by the World Health Organisation[15] and zero otherwise. This variable allows the analysis to control for the extraordinary economic and social disruptions caused by the pandemic, which may have influenced financial behaviour, crime patterns, and suspicious transaction reporting across countries.

Russian Invasion of Ukraine (invasion)

A dummy variable is constructed to capture the effects of the Russian invasion of Ukraine, taking the value 1 for years following the onset of the invasion and zero otherwise. The invasion began on 24 February 2022, as officially recognised by the United Nations and international organizations[16]. This specification

[14]For further information, see Basel AML Index (2025).

[15]The WHO declared COVID-19 a pandemic on 11 March 2020 and ended the public health emergency status on 5 May 2023. For further information, see WHO (2023).

[16]The Russian Federation launched a war and full-scale invasion of Ukraine on 24 February 2022. For further information, see United Nations (2022).

allows the analysis to test for changes in financial flows and reporting behaviour in the years following the official onset of the conflict, thereby isolating the direct impact of the war on financial flows, migration, and STR across Europe.

Table 4.1: Summary of Variables Used in the dataset

variable	**full name**	**unit of measure**
str	Suspicious Transaction Reports	Annual absolute number
str_d	Detrended Suspicious Transaction Reports (country-specific)	Annual absolute number
pop	Total Resident Population	Annual absolute number
unemp	Unemployment Rate (ILO standardized)	Annual % of labor force
n_mig	Net Migration per Capita	Annual per Capita
gdp	Gross Domestic Product per Capita	USD per Capita
inf	Consumer Price Index	% (annual)
fdi	Net Foreign Direct Investment Inflows	% of GDP
r_rem	Personal Remittances Received	Annual % of GDP
p_rem	Personal Remittances Paid	Annual % of GDP
c_corr	Control of Corruption Index	Index (−2.5 to 2.5)
g_eff	Government Effectiveness Index	Index (−2.5 to 2.5)
rof	Rule of Law Index	Index (−2.5 to 2.5)
ps_avt	Political Stability and Absence of Violence/Terrorism Index	Index (−2.5 to 2.5)
w_ref	War Refugees and Asylum-Seekers per Capita (from Ukraine, Belarus, Russia)	Annual per Capita
b_ind	Basel AML Index	Index (0-10)
g_ind	Governance Index	Standardized
covid	Global COVID-19 Pandemic	Dummy variable
invasion	Russian Invasion of Ukraine 2022	Dummy variable

Note: This table displays the variable abbreviation, full name, and measurement unit for each variable included in the dataset. All variables are annual, country-level panel data for 34 European countries over 2012-2023. Dummy variables equal 1 for the specified year(s) and zero otherwise. *invasion* codes the onset of the invasion and subsequent years (2022 and after), and *covid* codes years 2021-2023. To address multicollinearity, the *g_ind* was derived as the first principal component from a PCA of the governance-related variables. The detrended STR variable (*str_d*) was constructed as the fixed-effects residual from a regression of STR on the time trend, thereby correcting for non-stationarity (see Section 4.3).

4.2 Descriptive Statistics

This analysis is based on a balanced panel dataset comprising 408 annual observations across 12 years from 2012 to 2023. The core analytical sample covers 34 European countries (Figure 4.1), including both EU Member States and EU neighbouring states as *Albania, Moldova, North Macedonia, Norway, Serbia, Switzerland, Turkey, Ukraine*. STR data were originally compiled for a wider set of 40 countries, but the final analysis excludes *Croatia, Greece, Iceland, Kosovo, Bosnia and Herzegovina*, and *Montenegro* due to an incomplete series of STR data.

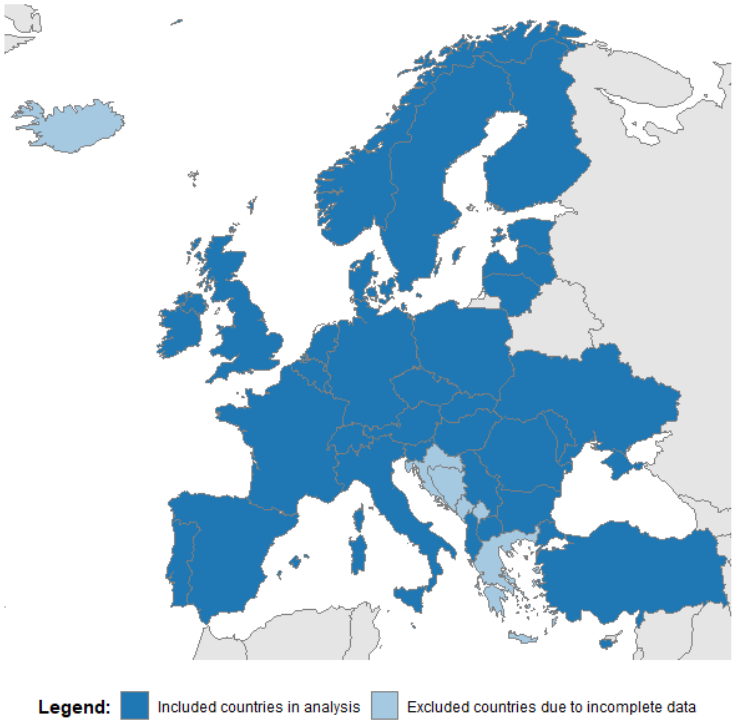

Figure 4.1: Coverage of European Countries

Note: This map shows the geographic scope of the analysis, highlighting the 34 European countries included in the dataset (shown in blue). Due to incomplete STR or Basel AML Index data, Croatia, Greece, Iceland, Kosovo, Bosnia and Herzegovina (shown in light blue) were excluded from the sample.

For additional information on common descriptive statistics of all variables, please refer to Table B.1 in Appendix B.

The following Figure 4.2 aims to examine the reporting trends of STRs described in the underlying literature. Consistent with the findings of Braun *et al.* (2016), the total number of STRs submitted varies markedly across European countries during the analysed period 2012-2023. The countries with the highest

cumulative STRs over the period are the United Kingdom (6.2 million), Moldova (4.5 million)[17], Turkey (2.7 million), and Germany (1.5 million). By contrast, the lowest reporting levels are observed in North Macedonia (2.7 thousand), Slovenia (9.8 thousand), and Albania (15.8 thousand).

However, national differences in legal definitions, institutional practices, and the sensitivity of obliged entities significantly influence reporting volumes. Thus, higher absolute numbers of STRs do not necessarily indicate a greater prevalence of suspicious transactions. Only a small fraction of reports often lead to formal investigation or prosecution. For further information, see Section 2.2.

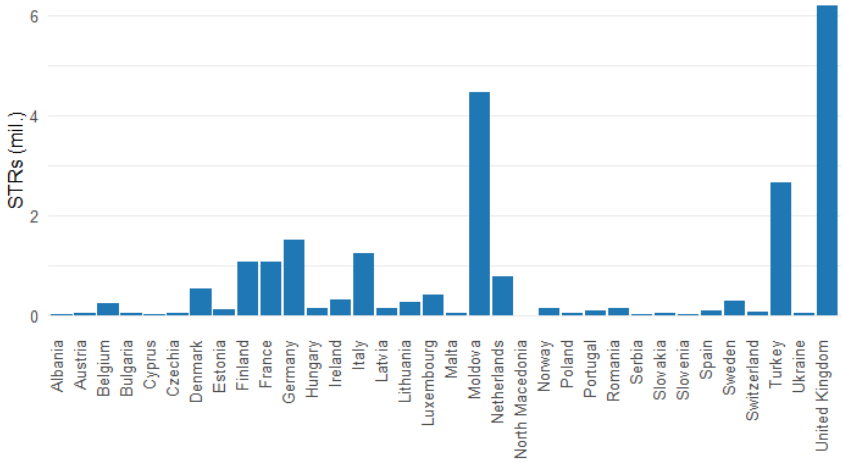

Figure 4.2: Sum of STRs (mil.) by Country 2012-2023

Note: This bar chart presents the total number of STRs, in millions, submitted by each country from 2012 to 2023. The data highlight significant variation in STR volumes across countries, with the United Kingdom and Moldova reporting the highest cumulative totals over the study period. This variation is driven primarily by differing reporting practices and thresholds established by individual FIUs, both between and within countries, rather than by actual differences in financial activity.

Braun *et al.* (2016) also demonstrates a significant positive association between the logarithm of GDP per Capita and the logarithm of STR numbers, attributing this relationship to the fact that larger and wealthier economies generate a higher volume of financial transactions, thereby increasing the likelihood of both legitimate and suspicious activities being reported. Our results corroborate this finding, as depicted in Figure 4.3, which presents the logged values of GDP per Capita and STRs for each country-year observation in the dataset.

[17]Moldova reports exceptionally high annual STR volumes for 2012-2018 due to broader legal definitions and differing national reporting standards. (Council of EU 2022)

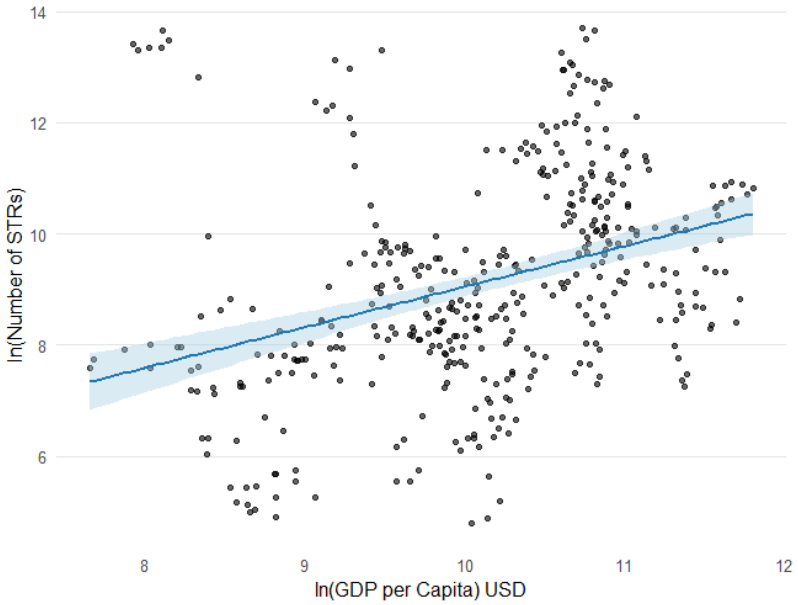

Figure 4.3: Log(GDP per Capita) vs. Log(STRs), 2012-2023

Note: This scatter plot with fitted regression line demonstrates a clear positive association between log(GDP per Capita) and log(STR counts) for European countries in 2012-2023. This pattern, consistent with Braun *et al.* (2016), reflects that wealthier economies generate more financial transactions, thereby increasing the volume of legitimate and STRs. The present dataset fully corroborates this established relationship.

Figure 4.4 visualises total STRs summed across all countries, with highlighted values for those countries reporting the highest annual STR levels. The panel reveals substantial heterogeneity in STR reporting, with the United Kingdom, Moldova[18], Turkey, Germany, and Italy consistently record the most significant volumes. Notably, total annual STRs in the EU exhibit a pronounced upward trajectory, particularly from 2019 to 2021. During this interval, the total number of reports rises exponentially, reflecting a substantial intensification in reporting practices or underlying suspicious activity. This escalation, peaking in 2021, may be attributable to the lagged effects of the COVID-19 pandemic, such as temporary regulatory relaxation and an increase in subsidiary institutions with less stringent oversight. Additionally, the exceptional spike observed in 2021 may be associated with heightened geopolitical tension and pre-war uncertainty preceding the Russian invasion of Ukraine. Such circumstances likely fostered increased vigilance among reporting entities and changes in the patterns of suspicious activity, further driving the surge in reported STRs during this period.

[18]This likely reflects a broader definition of STR adopted by the Moldovan FIU during 2012-2018.

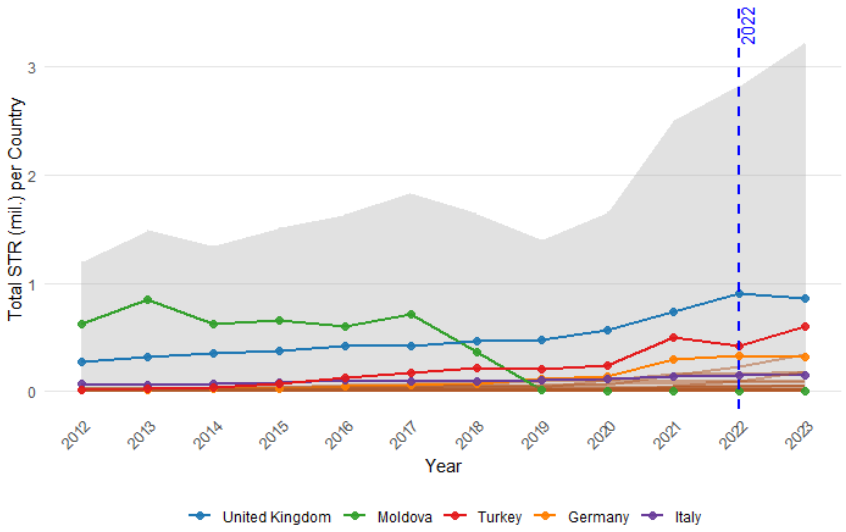

Figure 4.4: Annual STRs (mil.) by Country and Total STRs per year, 2012-2023

Note: This chart shows annual STRs (in millions) for the top five reporting countries and the total across all countries, 2012-2023. The data reveal strong cross-country heterogeneity and a sharp increase in total STRs from 2019 to 2021, likely linked to the COVID-19 pandemic and rising geopolitical tensions before the Russian invasion of Ukraine.

To further investigate the regional heterogeneity in reporting dynamics and to assess the possibility of pre-war financial outflows, Figure B.2 to Figure B.4 present a series of maps depicting the annual change in the z-score of STR filings for each European country from 2020 to 2023. If the Russian invasion of Ukraine were the primary driver of the surge in STRs, one would expect the most significant positive shocks to occur predominantly in the region's eastern countries. This expectation derives from the premise that conflict zones and adjacent areas typically experience intensified illicit financial activity and enhanced regulatory scrutiny during periods of instability, as proposed in HCSS (2025). However, the visual evidence does not reveal a clear spatial trend: the most pronounced increases in STR reporting z-scores are observed in Scandinavian countries. At the same time, much of Central Europe appears to absorb the geopolitical shock with relative stability. This lack of a consistent east-west divide suggests that the 2021 surge in STR activity reflects a more complex interplay of factors beyond proximity to conflict, including regulatory adaptation, national compliance cultures, COVID-19 and pre-existing reporting baselines. Nonetheless, both regional and external factors are likely at play. In the subsequent analysis, we attempt to capture the effect of conflict-driven displacement by including a war refugee variable in the econometric analysis.

4.3 Model Variable Selection

The initial phase of variable selection involved identifying relevant predictors based on findings from prior literature, as summarised in Section 2.1, while also being constrained by the availability and quality of data for 2012-2023. After constructing a balanced panel dataset, further diagnostics were performed to select the most appropriate variables for model estimation.

To reduce multicollinearity, both Pearson and Spearman correlation matrices were computed for all numeric variables (Table B.2). Highly correlated pairs (absolute correlation above $|0.8|$, following Mukaka (2012)) were flagged for exclusion from the same regression model. Notably, the governance variables (*c_corr*, *g_eff*, *rof*, *ps_avt*) exhibited substantial intercorrelations above this threshold. To address this, a composite governance index (*g_ind*) was constructed using the first principal component from a principal component analysis (PCA).[19] This composite index was subsequently used in place of the individual governance variables in the main model, thereby mitigating collinearity while retaining substantive information on governance quality.

Subsequently, each variable's coefficient of variation (CV) was calculated to assess relative variability in the data. The CV, defined as the ratio of the standard deviation to the mean, is a widely used, dimensionless indicator for comparing variability across variables with different units or scales (Bedeian & Mossholder 2000). Following standard practice, a threshold value of 0.1 was applied; variables with a CV below this level would be considered insufficiently dispersed and excluded from the analysis. However, all variables demonstrated adequate variability according to this criterion; thus, none were omitted. The resulting coefficients of variation are presented in Table B.1.

Finally, the stationarity of each variable was assessed using the Augmented Dickey-Fuller (ADF) test (Dickey & Fuller 1979), which examines the presence of unit roots in time series data. The null hypothesis of the ADF test indicates non-stationarity. As shown in Table B.3, all variables except for *str* rejected the unit root hypothesis at conventional significance levels ($p < 0.05$), confirming their stationarity and suitability for econometric analysis. However, the *str* variable did not reject the null hypothesis ($p = 0.296$), indicating non-stationarity and necessitating further transformation. To address this, the *str* series was transformed by removing the country-specific mean (fixed effect) and

[19] Principal component analysis (PCA) is a dimensionality reduction technique that transforms correlated variables into uncorrelated components; here, the first principal component summarises governance-related indicators as a single index.

the linear time trend for each country. The resulting stationary residuals were subsequently included in the econometric models as *str_d*. This detrending procedure can be represented as follows:

$$str_d_{it} = str_{it} - \hat{\alpha}_i - \hat{\beta} \cdot Year_{it} \tag{4.1}$$

Where:

- str_{it} is the observed value for country i in year t,
- $\hat{\alpha}_i$ is the estimated country fixed effect (mean for country i),
- $\hat{\beta}$ is the estimated slope of the linear time trend,
- $Year_{it}$ is the time variable.

This transformation removes both the average level and the linear temporal trend in STRs for each country, resulting in a stationary residual series suitable for panel data analysis (Wooldridge 2010).

Chapter 5

Methodology

This chapter outlines the methodological procedures for estimating the determinants of STRs in European countries, focusing on the context of Eastern European geopolitical tension. The analysis employs a panel dataset of annual country-level observations from 2012 to 2023. This structure allows for investigating between-country and within-country variation in STR levels. However, the limited number of post-invasion observations constrains the ability to draw robust conclusions about the immediate effects of recent geopolitical events.

The methodology is organised as follows: Section 5.1 discusses the variable transformations employed to address distributional properties and temporal dynamics. Subsection 5.2.1 outlines the statistical approach to model selection, including specification tests and the rationale for the chosen estimator. Subsection 5.2.2 presents diagnostic tests for evaluating model assumptions and describes implementing robust inference procedures.

Based on exploratory analysis and a rigorous variable selection process, the final empirical model is estimated as a one-way (country) fixed effects panel regression, formally specified as:

$$\begin{aligned} \text{str_d}_{it} = \; & \beta_1 \cdot \text{lag}\left(\log(\text{gdp}_{it})\right) + \beta_2 \cdot \text{inf}_{it} + \beta_3 \cdot \text{lag}\left(\log(\text{unemp}_{it})\right) \\ & + \beta_4 \cdot \text{lag}\left(\text{r_rem}_{it}\right) + \beta_5 \cdot \text{lag}\left(\log(\text{p_rem}_{it})\right) + \beta_6 \cdot \text{fdi}_{it} \\ & + \beta_7 \cdot \text{n_mig}_{it} + \beta_8 \cdot \log\left(\text{w_ref}_{it} + \delta\right) + \beta_9 \cdot \log(\text{b_ind}_{it}) \\ & + \beta_{10} \cdot \text{covid}_{it} + \beta_{11} \cdot \text{lag}(\text{invasion}_{it}) + \gamma_i + \epsilon_{it} \end{aligned} \tag{5.1}$$

where γ_i captures unobserved country-specific effects and ϵ_{it} denotes the idiosyncratic error term, and δ is a small positive constant.

Subsequent sections provide a detailed account of the model selection process and the rationale for including each variable.

The panel dataset analysed in this thesis contains both cross-sectional (country) and temporal (year) dimensions, allowing for a longitudinal approach that utilises both within-country and between-country variation. Although a two-way fixed effects model, controlling for both country-specific and time-specific unobserved heterogeneity, would initially seem appropriate, the final choice of estimator was guided by empirical specification tests as described in Subsection 5.2.1.

5.1 Variable Transformation

Before model estimation, variable transformations were implemented to address the data's distributional characteristics and dynamic relationships. These transformations were designed to improve the explanatory variables' statistical properties and ensure the validity of subsequent panel data analysis. The following subsections detail the specific transformation approaches adopted, including logarithmic transformation (Subsection 5.1.1) and lag transformation (Subsection 5.1.2).

5.1.1 Logarithmic Transformation

In preparation for panel data analysis, several variables were log-transformed to address skewness, non-linearity, and heteroskedasticity. Specifically, the following continuous variables were transformed using the natural logarithm: GDP per Capita (*gdp*), unemployment (*unemp*), paid remittances (*p_rem*), the number of war refugees (*w_ref*) and the Basel AML Index (*b_ind*). Logarithmic transformation is recommended for variables with highly skewed distributions or when elasticities are of interest, as it helps linearise relationships and stabilise variance (Wooldridge 2010).

Variable selection for transformation was based on exploratory data analysis, including histogram inspection and skewness statistics. Transformations were only applied to variables with strictly positive values, adding a small constant δ when necessary (e.g., for *w_ref*) to avoid undefined logarithms. This approach follows standard guidelines in applied panel econometrics.

Received remittances (*r_rem*) did not exhibit sufficient skewness to justify transformation and were thus included in their original form.

5.1.2 Lag Transformation

In addition to logarithmic transformation, several explanatory variables were included in their lagged forms to capture the temporal dynamics inherent in economic and geopolitical processes relevant to AML analysis. The economic rationale for applying lags is based on the understanding that the impact of these variables on STRs is not instantaneous, but instead operates with a delay as economic agents and institutions respond to evolving macroeconomic, financial, and institutional conditions (Wooldridge 2010). The following variables are subject to lagged specification:

- **Gross Domestic Product (*gdp*)**: The effects of changes in GDP on STR levels are rarely immediate. Growth in GDP typically increases the volume and complexity of financial transactions, but the impact on STRs often materialises with a lag, as individuals and institutions require time to adapt their financial behaviour and reporting practices.

- **Unemployment (*unemp*)**: Rising unemployment creates economic and financial pressures that gradually incentivise greater involvement in the shadow economy and illicit activities. These behavioural responses are delayed, developing over time rather than instantly, consistent with empirical findings in the shadow economy literature and econometric panel data methodology by Enste & Schneider (2000).

- **Paid Remittances (*p_rem*)** and **Received Remittances (*r_rem*)**: Remittance flows increase economic liquidity, but the risk of their involvement in suspicious transactions often emerges only after a temporal lag. This delayed effect justifies using lagged remittance variables in financial crime analysis by Acosta *et al.* (2007).

- **Invasion**: Empirical research shows that the economic consequences of armed conflict are realised over time rather than instantaneously. For example, Rodriguez-Heredia (2022) documents how the Bosnian civil war's effects on economic activity became most pronounced in later years. This supports using a lagged invasion variable to reflect delayed impacts on STRs.

Applying one-period lags is consistent with established econometric practice and helps to address potential simultaneity bias by ensuring the correct

temporal ordering of cause and effect (Wooldridge 2010). This methodological choice improves both the robustness and interpretability of the empirical results in the context of panel data analysis.

5.2 Methodology framework

Based on the diagnostic analyses detailed in Section 4.3, the final empirical specification incorporates the following explanatory variables: GDP per Capita, inflation, unemployment, received remittances, paid remittances, foreign direct investment, net migration per Capita, the number of war refugees per Capita, the Basel AML Index, the governance index, the COVID-19 pandemic, and an invasion dummy. The former estimated model can be formally expressed as:

$$\begin{aligned} \text{str_d}_{it} = \; & \text{gdp}_{it} + \text{inf}_{it} + \text{unemp}_{it} + \text{r_rem}_{it} + \text{p_rem}_{it} \\ & + \text{fdi}_{it} + \text{n_mig}_{it} + \text{w_ref}_{it} + \text{b_ind}_{it} \\ & + \text{g_ind}_{it} + \text{covid}_{it} + \text{invasion}_{it} + \gamma_i + \epsilon_{it} \end{aligned} \tag{5.2}$$

where γ_i captures the unobserved, country-specific effects and ϵ_{it} is the idiosyncratic error term.

This group of explanatory variables was subjected to rigorous model selection procedures to identify the most suitable estimation approach. The final model was refined using statistical criteria, such as the adjusted R^2 (via F-tests), and substantive economic reasoning to ensure empirical robustness and interpretive coherence. Variables with the highest p-values were iteratively considered for exclusion, with the model fit reassessed after each step. This stepwise process, with repeated F-tests and specification checks (including time effects), led to the exclusion of the governance index (g_ind), while all other initially selected variables were retained. Details on variable transformations are provided in Section 5.1.

5.2.1 Model Selection

Several alternative models were systematically compared to identify the most appropriate panel data estimation strategy, including pooled ordinary least squares (OLS), random effects, one-way fixed effects, two-way fixed effects, and first-difference estimators. Model selection was guided by a sequence of

specification tests: the Fisher-type (F)-test for *individual effects*, the Breusch-Pagan Lagrange Multiplier (LM) test for *random effects*, the Hausman test for *estimator consistency*, and supplementary F-tests for *time effects*. Results of these tests are summarised in Table 5.1.

F-test for Individual Effects.

To distinguish between pooled OLS and fixed effects estimation, an F-test for individual (country) effects was conducted, following the approach of Baltagi (2021). This test evaluates whether unobserved heterogeneity across countries is present and statistically significant. The null hypothesis asserts the absence of systematic individual effects, i.e., all intercepts are identical across panels, implying that pooled OLS would suffice. Rejection of the null hypothesis supports the inclusion of country-specific intercepts, thereby justifying a fixed effects specification. In the present analysis, the test statistic was highly significant ($F = 4.32$, $df_1 = 33$, $df_2 = 329$, p-value $= 1.89 \times 10^{-12}$), indicating substantial unobserved heterogeneity across countries. Consequently, the fixed effects model is preferred over pooled OLS.

Breusch-Pagan LM Test.

The Breusch-Pagan Lagrange Multiplier (LM) test, (Breusch & Pagan 1980), detect significant random effects in panel data. This test compares the fit of a random effects model against pooled OLS by examining whether the variance of the unobserved individual-specific component is significantly different from zero. The null hypothesis posits that no random effects exist, so all variation is captured by the idiosyncratic error term. If the test rejects the null hypothesis, this indicates that random effects are present and the random effects estimator is preferable to pooled OLS. In this analysis, the LM test was statistically significant ($\chi^2 = 8.12$, $df = 1$, p-value $= 0.00438$), confirming the relevance of panel effects and the necessity to move beyond a pooled OLS approach.

Hausman Test.

The Hausman test, initially introduced by Hausman (2015) and discussed in detail by Baltagi (2021), is a cornerstone for panel model selection. This test compares the fixed and random effects estimators under the null hypothesis that the random effects model is consistent and efficient, meaning the unobserved effects are uncorrelated with the regressors. If the null hypothesis is rejected, as

was the case here ($\chi^2 = 129.56$, $df = 11$, p-value $< 2.2 \times 10^{-16}$), it implies the random effects estimator is inconsistent due to correlation between unobserved effects and the explanatory variables. As a result, fixed effects estimation is theoretically justified and preferable for consistent inference.

F-test for Time Effects.

To determine the necessity of accounting for time-specific (i.e., year) unobserved effects in addition to country effects, an F-test for time effects was conducted, using the one-way fixed effects estimator as the baseline, as described in Baltagi (2021). This test examines whether including a set of time dummies (thus moving to a two-way fixed effects model) improves model fit. The null hypothesis is that time effects are absent. In the empirical application, the test statistic did not reach statistical significance ($F = 1.69$, $df_1 = 8$, $df_2 = 321$, p-value $= 0.0997$), suggesting that the addition of time fixed effects does not significantly improve the model. Therefore, a one-way (country) fixed effects model is sufficient.

Additional Specification Tests.

For completeness, the Hausman test was also implemented to compare the fixed effects and first-difference estimators. This diagnostic helps to assess whether fixed effects estimators provide consistent and efficient estimates relative to first-difference approaches, particularly in the presence of potential serial correlation or non-stationarity. The results ($\chi^2 = 130.35$, $df = 11$, p-value $< 2.2 \times 10^{-16}$) further supported the consistency and robustness of the fixed effects estimator in this context.

Table 5.1: Panel Model Selection Test Results

Test	**Statistic**	**df1**	**df2**	**p-value**
F test for individual effects	$F = 4.3247$	33	329	1.89×10^{-12}
Breusch-Pagan LM Test (BP)	$\chi^2 = 8.1182$	1	–	0.00438
Hausman Test (FE vs. RE)	$\chi^2 = 129.56$	11	–	$< 2.2 \times 10^{-16}$
F test for twoways effects	$F = 1.6907$	8	321	0.0997
Hausman Test (FE vs. FD)	$\chi^2 = 130.35$	11	–	$< 2.2 \times 10^{-16}$

Note: Results of panel model specification and diagnostic tests. Each test assesses the suitability of alternative estimators or the consistency of fixed effects relative to alternatives, using the reported statistics and p-values. Based on these results, the *country fixed effects panel model* was selected as the final specification.

Based on this multi-stage diagnostic procedure, the country fixed effects estimator was selected as the most appropriate specification for the primary analysis. Both pooled OLS and random effects models were decisively rejected, and including time effects was not supported. This approach ensures the model properly accounts for unobserved heterogeneity across countries and yields consistent estimates of the relationship between STR levels and the explanatory variables.

5.2.2 Fixed Effects Estimation Assumptions

To ensure the reliability and validity of the empirical results, the fixed effects model was rigorously tested against the standard assumptions required for linear panel data estimation. The following diagnostic procedures were implemented to confirm the appropriateness of the model for inference, by established methodological guidelines (Baltagi 2021; Wooldridge 2010).

Linearity and Model Specification

As formulated in Equation 5.1, the empirical model is linear in parameters, and all included regressors are time-varying. Multicollinearity was investigated using correlation matrices and variance inflation factors (VIFs), as suggested by Wooldridge (2010). No evidence of problematic collinearity or redundant variables was found (see Table B.2 and Table B.4).

Random Sampling and Cross-Sectional Dependence

Standard panel data methods assume independence across units. However, European countries are likely interconnected economically and politically. The Pesaran CD test (Baltagi 2021) revealed strong cross-sectional dependence. Accordingly, all inferential statistics were computed using two-way clustered robust standard errors by country and year, as recommended by Cameron *et al.* (2011).

Table 5.2: Pesaran CD Test for Cross-Sectional Dependence

Test	**Statistic**	p**-value**	**Alternative Hypothesis**
Pesaran CD	$z = 12.98$	$< 2.2 \times 10^{-16}$	Cross-sectional dependence

Note: The Pesaran CD test assesses contemporaneous dependence across panel units. The results indicate that shocks or dynamics in one country are correlated with those in others within the panel.

Heteroskedasticity

The Studentized Breusch-Pagan test was performed on the squared residuals of the fixed effects model (Wooldridge 2010) to test whether the residuals exhibited constant variance. The null hypothesis of homoskedasticity was decisively rejected, indicating the presence of heteroskedasticity. Consequently, robust standard errors were used in all hypothesis tests and confidence intervals.

Table 5.3: Studentized Breusch-Pagan Test for Heteroskedasticity

Test	**Statistic**	**df**	p**-value**
Studentized Breusch-Pagan	$BP = 5.65$	10	0.843

Note: The studentised Breusch-Pagan test assesses the presence of heteroskedasticity in the residuals. The non-significant result ($p = 0.843$) indicates no evidence of heteroskedasticity in the model residuals.

Serial Correlation

Autocorrelation in the idiosyncratic errors was assessed using the Wooldridge/Breusch-Godfrey test, (Wooldridge 2010). The null hypothesis of no serial correlation was rejected at a high level of statistical significance, confirming the need for standard error adjustment.

Table 5.4: Breusch-Godfrey/Wooldridge Test for Serial Correlation

Test	**Statistic**	**df**	p**-value**
Breusch-Godfrey	$\chi^2 = 164.47$	11	$< 2.2 \times 10^{-16}$

Note: The Breusch-Godfrey/Wooldridge test assesses whether residuals in the panel model are serially correlated over time. The results indicate the presence of autocorrelation, suggesting that residuals in one period are correlated with those in subsequent periods.

Normality of Residuals

The Shapiro-Wilk test evaluated whether the model's residuals followed a normal distribution (Table 5.5). Nonetheless, due to the sufficiently large sample size, the application of asymptotic theory is justified by the central limit theorem (Wooldridge 2010). The Figure 5.1 indicates a Q-Q plot to approximate normality for the bulk of the residuals, with deviations primarily in the distribution tails.

Table 5.5: Shapiro-Wilk Normality Test for Residuals

Test	**Statistic**	p**-value**
Shapiro-Wilk	$W = 0.826$	$< 2.2 \times 10^{-16}$

Note: The Shapiro-Wilk test assesses whether model residuals follow a normal distribution. The results indicate significant departures from normality, though this is generally less concerning in large samples.

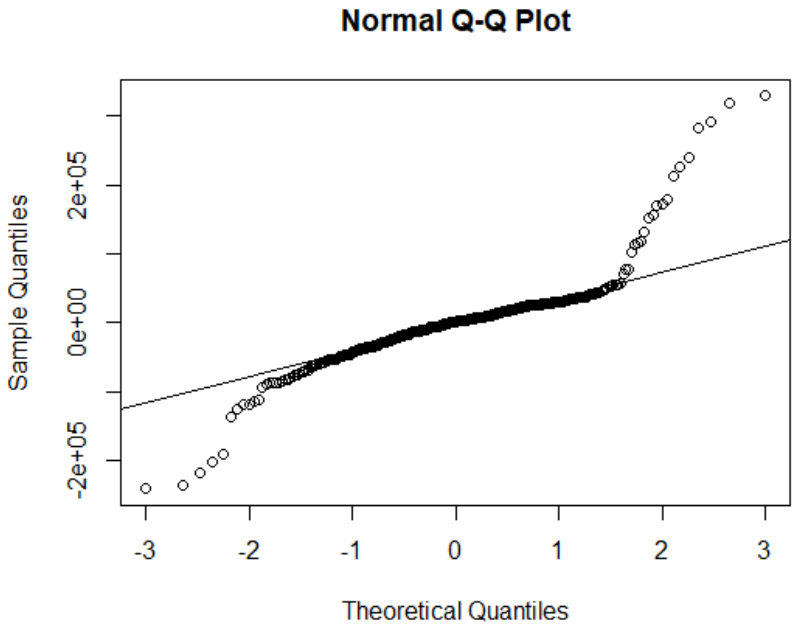

Figure 5.1: Q-Q plot of residuals from the fixed effects model.
Note: The Q-Q plot assesses the normality of residuals from the fixed effects model. Deviations from the reference line at the distribution tails indicate departures from normality, consistent with the results of the Shapiro-Wilk test.

Robust Inference

Given the documented presence of heteroskedasticity, serial correlation, and cross-sectional dependence, all coefficient standard errors were estimated using the Arellano-type two-way clustering method (Cameron *et al.* 2011). This approach ensures that the inference presented in Table 6.1 is robust to the principal violations of classical linear model assumptions commonly encountered in macro-panel settings. As a result, the standard errors and related hypothesis tests remain valid even when the efficiency property of the best linear unbiased estimator (BLUE) no longer holds.

Chapter 6

Empirical Results

This chapter presents the findings from the fixed effects panel model estimation of the determinants of STRs in European countries from 2012 to 2023. The analysis assesses each variable's statistical significance and economic relevance, explicitly relating the results to the hypotheses. Robust inference is ensured by adjusting standard errors using Arellano-type two-way clustering.

Table 6.1: Fixed Effects Estimation Results

Dependent variable: str_d			
Variable	Estimate	Robust std. error	
lag(log(gdp))	−165,282.10	80,103.38	**
inf	4,203.35	1,072.94	***
lag(log(unemp))	−27,115.12	17,632.20	
lag(r_rem)	44,249.97	25,514.46	*
lag(log(p_rem))	−48,115.04	19,352.08	**
fdi	29.95	27.40	
n_mig	−438,648.60	514,610.90	
log(w_ref + 1e-6)	−3,580.14	3,754.25	
log(b_ind)	−34,870.81	44,489.35	
covid	12,615.17	16,042.98	
lag(invasion)	22,439.23	13,684.82	
Observations	374		
Total sum of squares	2.44e12		
Residual sum of squares	1.45e12		
R^2	0.337		
Adjusted R^2	0.248		
F Statistic	15.204*** (df = 11; 329)		

Significance codes: $^{***}p < 0.01$; $^{**}p < 0.05$; $^{*}p < 0.1$

Note: Coefficient estimates are from a country fixed effects panel regression of detrended STRs. Standard errors are clustered two-way by country and year (Arellano method). The model is based on 374 observations across 34 countries from 2012-2023.

- **gdp:** The coefficient on lagged log-GDP is negative and statistically significant at the 5% level. This suggests that, ceteris paribus, an above-trend increase in prior-year GDP is associated with a decline in *str_d*, the detrended deviation in STRs. Conditional on country fixed effects and time trends, positive economic shocks appear to suppress anomalous STR reporting temporarily. This contradicts *Hypothesis 2*, which anticipated that weaker economic performance would elevate STR levels.

- **inf:** The coefficient on inflation is positive and statistically significant at the 1% level. A one-point increase in inflation above a country's long-run trend is associated with a rise in *str_d*, the detrended deviation in STRs. Conditional on country fixed effects and time trends, inflation shocks increase anomalous STR reporting. This supports *Hypothesis 5*, which links price instability to heightened financial system stress and suspicious activity detection.

- **unemp:** The coefficient on lagged log-unemployment is negative but statistically insignificant. This suggests that short-term unemployment deviations do not consistently affect *str_d*, the detrended deviation in STRs. As such, the result provides no partial support for *Hypothesis 2*, which expected adverse labour market conditions to elevate STR activity.

- **fdi, b_ind, covid:** The coefficients on Foreign Direct Investment inflows, the log of the Basel AML Index, and the COVID-19 dummy are not statistically significant. This indicates that short-term deviations in external capital flows, institutional AML/CFT risk, and the pandemic did not show a robust association with changes in *str_d*, the detrended deviation in STRs. All three variables were included as control variables and were not directly linked to any tested hypothesis.

- **r_rem:** The coefficient on lagged received remittances is positive and marginally significant at the 10% level. This provides partial support for *Hypothesis 3*, suggesting that above-trend inflows may be associated with increases in *str_d*, the detrended deviation in STRs, potentially reflecting heightened exposure to ML risks.

- **p_rem:** The coefficient on lagged log-transformed paid remittances is negative and statistically significant at the 5% level. This supports *Hypothesis 4*, indicating that above-trend remittance outflows are associated

with declines in *str_d*, the detrended deviation in STRs, potentially reflecting reduced domestic suspicious activity or improved compliance in outbound financial channels.

- **n_mig, w_ref:** The coefficients on net migration per Capita and log-transformed war refugee inflows are negative and statistically insignificant. This suggests that short-term deviations in general migration intensity and conflict-related displacement do not exhibit a robust association with changes in *str_d*, the detrended deviation in STRs. While *n_mig* was included as a control variable, the result for *w_ref* provides no empirical support for *Hypothesis 6*, which posited that refugee inflows would increase suspicious transaction reporting.

- **invasion:** The coefficient on the lagged Russian invasion dummy is positive but statistically insignificant. This indicates that the outbreak of open conflict in Ukraine did not produce a systematic within-country increase in *str_d*, the detrended deviation in STRs, beyond existing structural patterns. The result does not support *Hypothesis 1*, which anticipated a conflict-driven rise in suspicious transaction reporting.

6.1 Model Fit and Joint Significance

The adjusted R^2 of 0.248 indicates that the model explains approximately 25% of the within-country variation in detrended STRs. Although modest, this aligns with expectations for macro-panel data involving socio-financial variables, where much of the variation stems from latent institutional or behavioural factors not directly observable.

The joint F-statistic ($F = 15.204$, $p < 0.01$) confirms that the explanatory variables collectively contribute significantly to the model's fit. Arellano-type two-way clustered standard errors ensure robust inference by addressing heteroskedasticity, serial correlation, and cross-sectional dependence.

Overall, the results indicate that macroeconomic instability, especially inflation shocks, has a stronger and more consistent effect on short-term STR fluctuations than geopolitical events or demographic changes. This supports the view that structural macro-financial factors outweigh acute external shocks in shaping financial crime detection across Europe during the study period.

Chapter 7

Conclusion

This thesis investigates the determinants of STRs across 34 European countries from 2012 to 2023, focusing on an acute geopolitical shock, the Russian invasion of Ukraine. While the research was initially motivated by the hypothesis that conflict-related disruptions would induce observable shifts in STR activity, the empirical evidence indicates that macroeconomic volatility, most notably inflation shocks, constitutes the primary driver of anomalous reporting patterns in the short run.

The analysis draws on a newly constructed balanced panel dataset that integrates annual STR counts with demographic, economic, and conflict-related variables, sourced from international institutions and national FIUs. This dataset allows for comparative analysis across countries and years in light of the data constraints in the AML/CFT domain. Using a country fixed effects regression model and robust Arellano-type standard errors, the framework isolates within-country variation while accounting for unobserved heterogeneity and time trends.

The results underscore the significant role of inflation shocks in elevating STR deviations, consistent with the notion that price instability increases financial system vulnerability and contributes to heightened financial stress among economic actors. Conversely, higher levels of lagged GDP are associated with reductions in STR volumes, suggesting that prior economic expansion mitigates suspicious transaction reporting. Other macroeconomic variables, such as unemployment, net migration, and FDI, do not exert statistically robust effects after accounting for persistent country-level characteristics.

Remittance flows exhibit asymmetric effects: lagged received remittances are linked to short-run increases in STR activity, while above-trend lagged paid

remittances correspond to temporary declines. These findings highlight the dual role of remittance channels as economic stabilisers and potential conduits for illicit finance. Neither the COVID-19 pandemic nor the immediate aftermath of the Russian invasion of Ukraine produces statistically significant shifts in STR patterns, likely due to the limited post-conflict observation period and the adaptive capacity of financial institutions and regulators during crises.

Crucially, the analysis highlights that STRs are not neutral indicators of illicit activity but the outputs of institutionally embedded detection systems. Their volume and volatility reflect underlying risk factors and national differences in reporting thresholds, internal compliance procedures, supervisory pressure, and the technological maturity of obliged entities. As such, a high STR count may signify heightened regulatory vigilance, automated transaction monitoring, or even defensive over-reporting, rather than a higher prevalence of ML itself. This interpretation problem underscores the importance of embedding institutional quality controls and governance indicators within empirical models of financial crime detection.

Several limitations must be acknowledged. The short post-invasion observation window constrains detecting delayed or cumulative conflict effects. Furthermore, cross-country variation in detection practices, STR thresholds, and institutional quality complicates comparability and raises concerns about interpreting STR levels as direct proxies for illicit activity. High volumes may reflect heightened compliance rather than elevated risk. Nonetheless, constructing a harmonised, multi-country STR dataset covering more than a decade represents a substantive methodological contribution. This data foundation provides opportunities for future longitudinal research on AML/CFT system responsiveness to shocks of various origins.

In conclusion, this thesis contributes to the literature by demonstrating that macro-financial instability, particularly inflation and remittances, consistently influences STR dynamics more than acute geopolitical shocks. The findings call for greater regulatory focus during inflationary periods and underscore the need to harmonise STR standards across European jurisdictions. Strengthening the analytical capacity of FIUs to differentiate between signal and noise in STR reporting will be essential for improving the effectiveness of Europe's AML/CFT regimes. Future research should extend the temporal horizon to capture the long-run effects of conflict and assess how institutional heterogeneity among reporting entities shapes the efficacy and reliability of STR-based detection systems.

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Appendix A

Extended definitions and AML/CFT framework

A.1 AML/CFT extended definitions

This section presents extended definitions of key terms pertinent to the research and the AML/CFT frameworks. This exercise aims to establish conceptual clarity and consistency in terminology across the thesis, providing an apparent reference for readers without requiring them to consult the main text.

A.1.1 Suspicious Transaction Reports (STRs)

A STR is a formal notification submitted by financial or designated non-financial institutions to the competent FIU when there are reasonable grounds to suspect that a transaction, attempted transaction, or activity is linked to ML, FT, or related predicate offences. STRs include details about the transaction and the rationale for suspicion, allowing the FIU to conduct an analysis and, if warranted, forward the case to law enforcement agencies (EUROPOL 2021).

According to Article 33 of the 4th and 5th EU Anti-Money Laundering Directives (Directives 2015/849 and 2018/843), reporting is mandatory irrespective of the transaction amount and applies to completed and attempted transactions (European Parliament and Council 2015). The reporting duty is accompanied by legal protections for the filer and a strict prohibition on tipping off clients. The scope of STR reporting extends across financial institutions, legal professionals, real estate agents, casinos, and other obliged entities.

In practice, STRs may be triggered by a range of conditions, including:

- Transactions exceeding legally mandated monetary thresholds,
- Dealings involving individuals or entities listed on sanctions registers (e.g., under EU, UN, OFAC regimes),
- Structuring or "smurfing" of transactions to evade reporting obligations,
- Transfers involving high-risk or non-cooperative jurisdictions,
- Transactions inconsistent with the known economic profile or declared activity of a client,
- Alerts from automated transaction monitoring systems using rule-based or machine learning models.

It is crucial to emphasise that submitting an STR does not equate to confirmed criminal activity. STRs are based on a subjective, precautionary assessment by the reporting institution, guided by internal policies and compliance obligations rather than judicial standards of proof. Thus, STR volumes may be heavily influenced by institutional risk tolerance, the regulatory environment, the design of detection systems, and shifts in supervisory expectations, which may vary significantly across countries and over time.

Within the broader AML/CFT framework, STRs serve both tactical and strategic purposes. Tactically, they enable the early detection of suspicious behaviour and facilitate timely intervention. Strategically, aggregated STR data inform typology analysis, national risk assessments, and policy evaluation, especially during geopolitical or macroeconomic disruption (Cotoc *et al.* 2021). While STRs are a central element of financial surveillance, its use as a proxy for actual crime prevalence must be approached with caution due to its indirect, institutionally mediated nature.

A.1.2 Financial Action Task Force (FATF)

The FATF, founded at a G7[1] summit, is the principal international standard-setter in the fight against ML, FT, and proliferation financing (FATF 2025c). It issues a comprehensive set of Recommendations, initially 40, later expanded, that serve as the global benchmark for AML/CFT frameworks (FATF 2025d).

[1]The Group of Seven (G7) comprises Canada, France, Germany, Italy, Japan, the United Kingdom, and the United States.

While not legally binding, these standards are widely adopted in domestic legislation.

The FATF emphasises technical compliance and real-world effectiveness, measured by risk-based supervision, intelligence use, prosecutions, and asset recovery. Its core assessment process, the mutual evaluation[2], involves expert teams reviewing legal frameworks and practical outcomes, specifically technical compliance with each Recommendation and achievement of eleven Immediate Outcomes (Levi & Reuter 1997).

Country ratings are classified as:

- Compliant (C)
- Largely Compliant (LC)
- Partially Compliant (PC)
- Non-Compliant (NC)

For effectiveness (Immediate Outcomes):

- High
- Substantial
- Moderate
- Low

Jurisdictions with substantial deficiencies enter remediation under the International Co-operation Review Group (ICRG); those of grave concern are placed on the public 'grey' or 'black' lists, which, despite the FATF's lack of direct enforcement power, have significant global impact on financial flows and reputational risk (FATF 2025c).

The FATF routinely updates its standards in response to evolving threats, such as proliferation financing and misuse of virtual assets. As of 2025, more than 200 jurisdictions have committed to implementing the FATF Recommendations (FATF 2025d). The organisation works closely with international partners, including the IMF, World Bank[3], United Nations[4], and Egmont Group[5]

[2] A peer-review system in which countries assess each other's AML/CFT frameworks for compliance and effectiveness.

[3] An international financial institution supporting development projects.

[4] Founded in 1945 to promote peace and cooperation.

[5] A global network of national FIUs fostering AML/CFT collaboration.

to promote convergence toward robust AML/CFT standards worldwide (Levi & Reuter 1997).

A.1.3 Financial Intelligence Unit (FIU)

A FIU is a specialised national agency mandated to receive, analyse, and disseminate information related to suspected ML and FT activities, serving as the central repository for STR submissions. In addition to STR, some FIUs collect other reports such as significant cash transaction disclosures. Upon receipt, the FIU employs analytical methods to detect patterns indicative of illicit finance, and, where warranted, disseminates financial intelligence to competent authorities such as law enforcement or prosecutors for further action (Egmont Group 2025b).

The core functions and operational standards of FIUs are established by international bodies. *FATF Recommendation 29* defines the essential features of an FIU, while the Egmont Group Charter sets principles for operation and international cooperation (Egmont Group 2023). These standards require FIUs to access relevant financial and law enforcement data, obtain further information from reporting entities, and exchange intelligence with foreign counterparts. Operational autonomy and independence are essential to ensure impartial analysis and dissemination (Egmont Group 2023). FIU may follow different organisational models:

- *Administrative* (standalone or within central banks/finance ministries)
- *Law enforcement-based* (with investigative powers)
- *Hybrid* (combining both functions)

These models affect legal authority, access to information, and cooperation capacity. Administrative models often excel at strategic analysis, while law enforcement-based units may expedite investigations (Transparency International 2019).

Within the EU, FIUs cooperate through the decentralised *FIU.net* network, which facilitates secure cross-border information exchange in line with data protection standards (Parliament 2022). Most global FIUs, including those in the EU, are members of the Egmont Group, which provides a secure platform for international intelligence exchange and best practice sharing (Egmont Group 2023).

In summary, the FIU functions as the national centre for financial intelligence, linking the private sector (which reports suspicious activity) and law enforcement. The effectiveness of an FIU depends on its statutory powers, analytical capacity, quality and quantity of reports, and its ability to exchange information domestically and internationally (IMF 2004). Strengthening FIU capacity and cooperation remains a key objective of the global AML/CFT framework.

A.1.4 Money Laundering (ML) and Financing of Terrorism (FT)

ML refers to processing criminal proceeds to disguise their illicit origin, enabling their integration into the legitimate financial system (UNODC 2025). The process is conventionally divided into three stages:

- **Placement**: Illicit funds enter the financial system.
- **Layering**: Complex transactions are executed to obscure the audit trail.
- **Integration**: Laundered funds are made to appear legitimate.

International frameworks, notably the FATF Recommendations and United Nations conventions, such as the *1988 Vienna Convention* and the *2000 Palermo Convention*, require states to criminalise ML, encompassing conversion, transfer, concealment, and disguise of criminal proceeds (UNODC 1988). These frameworks also obligate the criminalisation of a broad range of predicate offences and the implementation of asset tracing and confiscation mechanisms.

FT is criminalised as the provision, collection, or use of funds intending to finance terrorist acts or organisations, regardless of whether the funds are of legal or illegal origin (United Nations 1999). The central focus is on intent, not provenance. Since 2001, FATF standards also require targeted financial sanctions in line with relevant United Nations Security Council Resolutions[6].

Although the objectives of ML (legitimising illicit gains) and FT (funding terrorism) differ, both exploit weaknesses in the financial system, such as opacity and insufficient oversight. As a result, preventative measures, including customer due diligence, STR filing, cross-border controls, and international cooperation, are closely aligned with FATF (2025d). The Council of Europe[7] and

[6]United Nations Security Council Resolutions are binding decisions addressing international security, sanctions, and counter-terrorism measures.

[7]A regional organisation promoting human rights, democracy, and the rule of law.

other global bodies, such as the IMF, have developed comprehensive frameworks and standards to guide member states in combating both threats (IMF 2025), including controls on proliferation financing. The aim is both to prosecute offenders and to safeguard the integrity of the international financial system.

A.1.5 Obliged Entity

An *obliged entity* in the context of AML/CFT is any natural or legal person mandated by law to implement preventive measures against money laundering and terrorist financing (Ferwerda *et al.* 2019). Such entities, often termed *reporting entities* or *covered persons*, are required to conduct customer due diligence (KYC), monitor and record transactions, and report suspicious activities to the FIU. Their obligations are stipulated by law, covering sectors and professions vulnerable to misuse for ML or FT.

The European Union's Fifth Anti-Money Laundering Directive (European Parliament and Council 2018) and the FATF standards (FATF 2025a) enumerate obliged entities to include:

- Credit and financial institutions (including banks, insurers, and payment service providers)
- Auditors, accountants, and tax advisors
- Notaries and independent legal professionals
- Trust and company service providers
- Estate agents and persons trading in high-value goods (such as art or precious metals), where cash transactions exceed EUR 10,000
- Gambling service providers
- Cryptocurrency exchanges and custodian wallet providers
- Dealers and intermediaries in works of art, for transactions above the EUR 10,000 threshold

These definitions extend to non-financial businesses and professions DNFBP, as designated by the FATF. Obliged entities must identify and verify customers and beneficial owners[8], assess and manage risks, apply enhanced due diligence in high-risk cases (such as politically exposed persons[9] or high-risk countries),

[8]The ultimate ownership or control of an asset or company.
[9]Individuals with prominent public functions posing higher corruption risks.

maintain records (typically for five years under EU law), and file suspicious transaction reports with the FIU.

The regulatory scope is dynamic, expanding to address emergent risks, recently including virtual asset service providers and art dealers, reflecting the evolving nature of financial crime (Ferwerda *et al.* 2019). Thus, regulators continuously adapt obliged entities' definitions and obligations to mitigate emerging economic threats.

A.2 Global AML/CFT Standards and Practices

This section overviews the principal international standards and practices that underpin AML and CFT frameworks. The purpose of this section is to provide a contextual framework for the subsequent detailed discussion of European arrangements. To this end, it will first outline the key regulatory instruments and cooperative mechanisms that guide national implementation. Initially, major international standards are introduced, followed by specific frameworks in the European Union and non-EU European jurisdictions (European Commission 2024).

A.2.1 Key International Guidance

Global AML/CFT practice is shaped by the following standards and bodies:

- **FATF Recommendations:** The FATF's 40 Recommendations, accompanied by interpretive notes and guidance, constitute the global baseline for AML and CFT. These standards, updated to address evolving threats (e.g., virtual assets, beneficial ownership), are risk-based and technology-neutral, and serve as benchmarks for national assessment (FATF 2025d).
- **Basel Committee on Banking Supervision (BCBS):** The Basel Committee on Banking Supervision (BCBS) issues detailed guidance, notably its 2014/2020 *Sound Management of Risks* framework, emphasising risk-based due diligence, customer verification, group-wide controls, and correspondent banking protocols. While non-binding, these guidelines strongly influence supervisory practices and enforcement expectations (BCBS 2020).
- **Wolfsberg Group:** Comprising leading international banks, the Wolfsberg Group develops voluntary principles for AML compliance, including

private and correspondent banking, sanctions screening, and beneficial ownership. Its standards have shaped industry best practice and informed regulatory policy, particularly regarding SWIFT message transparency[10] (Wolfsberg Group 2025).

- **United Nations Conventions:** International legal obligations arise from treaties such as the Vienna Convention (1988), Palermo Convention (2000), and the Terrorist Financing Convention (1999). These instruments mandate criminalisation, asset freezing, and mutual legal assistance, forming the legal foundation for national systems and FATF evaluation criteria (UNODC 2000).

- **EU AML Directives:** In the EU, successive AML Directives (1st-6th) have progressively aligned and expanded FATF standards, notably by mandating public registers of beneficial ownership and extending regulatory scope. Member States must transpose these measures, driving harmonisation within and beyond the EU (Council of EU 2024a).

These standards collectively define the global AML/CFT architecture: FATF sets strategic priorities; BCBS and Wolfsberg provide operational guidance for financial institutions; UN conventions supply legal underpinnings; and EU directives exemplify supranational harmonisation. This multilayered framework enables adaptability and convergence in the fight against illicit finance BCBS (2020).

A.2.2 AML/CFT Framework in the EU

The EU's AML and CFT framework is recognised as one of the most advanced globally, reflecting the complexity of the single market and the region's steadfast commitment to combating financial crime (European Commission 2024). This framework encompasses a sophisticated array of EU-level legal instruments, notably Directives and Regulations, and a multi-level institutional architecture involving supranational and national authorities[11]. The subsequent section provides a detailed account of, firstly, the institutional structure and, secondly, the legislative evolution of EU AML/CFT rules.

[10] A global financial messaging service for secure, standardised interbank transactions.

[11] An entity whose authority extends across multiple countries, such as the European Commission or the FATF.

Institutional Structure of the AML/CFT Framework in the EU

At the supranational level, the European Commission initiates and coordinates AML/CFT policy, proposes legislation, and oversees Member State compliance, including the authority to initiate infringement proceedings. The Commission's work is complemented by the EBA and other ESA, which issue supervisory guidelines, maintain a central database of deficiencies, and can intervene where national supervision is inadequate. Notably, following a series of banking scandals, the Commission has proposed the creation of a dedicated EU Anti-Money Laundering Authority to centralise oversight further (European Commission 2024).

National NCA are charged with day-to-day supervision and enforcement, monitoring obliged entities and applying a risk-based approach[12] in line with EU law (EBA 2025). They coordinate with peers through EU-level forums, particularly for cross-border supervision.

Each Member State maintains a national FIU, tasked with collecting and analysing STR. FIUs cooperate through the EU FIU Platform and the decentralised *FIU.net*, enabling cross-border intelligence exchange, supported by EUROPOL (2020).

In summary, the EU's multi-level AML/CFT architecture balances national implementation with strong supranational coordination, aiming to achieve regulatory harmonisation and integrated defences against financial crime European Commission (2024).

A.2.3 AML/CFT Framework in Non-EU European Countries

Many non-EU European states, including those in Eastern Europe, the Caucasus, and several microstates, have implemented AML/CFT frameworks that generally reflect international standards established by the FATF, and are increasingly influenced by evolving EU norms. Regional coordination is chiefly conducted by the Council of Europe's Committee of Experts on the Evaluation of Anti-Money Laundering Measures and the Financing of Terrorism (MONEYVAL) Committee and the Eurasian Group (EAG), both serving as FATF-style regional bodies (Levi 2002).

Nearly all jurisdictions participate in either the FATF or an affiliated FATF-Style Regional Bodies (FSRB) (e.g., MONEYVAL), and have enacted domestic

[12]The allocation of AML/CFT resources according to the level and type of risk posed by customers, products, and geographies.

legislation criminalising ML and FT, established national FIU, and imposed preventative measures in line with FATF Recommendations. The scope of obliged entities covering financial and non-financial sectors is comparable to the EU. FIU are responsible for receiving, analysing, and disseminating STR, as well as engaging in international cooperation through the Egmont Group (Strauss 2010).

Progress is primarily driven by the mutual evaluation process, which encourages legislative and institutional reforms such as implementing beneficial ownership registries and enhancing supervision of high-risk sectors. However, the extent and pace of reform vary according to political will, resource allocation, and broader geopolitical conditions (Council of EU 2023).

A persistent challenge is the divergence between technical compliance and effective implementation. Resource constraints, inadequate training, and weak inter-agency coordination can limit supervisory capacity and the development of a robust compliance culture. While some countries have advanced inter-agency cooperation, others remain institutionally fragmented (Strauss 2010).

Nonetheless, recent MONEYVAL assessments highlight improvements in both technical compliance and effectiveness, supported by targeted technical assistance from the Council of Europe, the EU, and other international partners. Priority areas include asset recovery, risk assessment, and digitalisation. Yet, in contexts marked by entrenched corruption or weak accountability, reforms may prove largely symbolic (Council of EU 2023).

In summary, non-EU European AML/CFT regimes broadly align with international standards, though implementation remains uneven. Overall, convergence with EU and FATF norms is advancing, driven by mutual evaluations and regional cooperation (Council of EU 2024b).

Regional Cooperation and International Obligations

Regional cooperation is critical for enhancing AML/CFT capacity in non-EU European states. The Council of Europe's MONEYVAL evaluates over thirty jurisdictions, promoting reforms such as FIU establishment, criminalisation of terrorist financing, and oversight of high-risk sectors (Strauss 2010). It also organises typologies meetings on risks such as virtual assets and investment migration.

The Eurasian Group (EAG) supports post-Soviet states. Although Russia exited the FATF in 2022, it remains active in the EAG, encouraging reforms

in Belarus and Kazakhstan, including predicate offence expansion and cross-border controls (EAG 2024).

Most non-EU countries are parties to UN conventions on organised crime and corruption, enabling asset recovery and joint investigations (UNODC 2000). Many also belong to the Egmont Group, facilitating secure FIU-to-FIU intelligence exchange; for instance, Serbia and Montenegro have coordinated STR referrals via Egmont channels (Egmont Group 2025a).

The Organisation for Security and Co-operation in Europe (OSCE) contributes through workshops and technical reports on nonprofit abuse, terrorist financing, and de-risking. These efforts support compliance with evolving FATF standards, especially in states with large remittance flows or financial exclusion risks (OSCE 2025).

Nonetheless, implementation gaps persist. Some states face sanctions, conflict, or economic fragility, while political commitment to transparency and stand-alone money laundering prosecutions remains uneven (Council of EU 2025). MONEYVAL and others stress the need for systematic follow-up and inter-agency cooperation (Council of EU 2023).

In summary, non-EU states benefit from growing engagement in compliance review (MONEYVAL, EAG), intelligence exchange (Egmont), and capacity-building (OSCE). These mechanisms have improved transparency and coordination, though progress varies and often relies on external incentives, such as avoiding FATF grey-listing (FATF 2025b).

Appendix B

Extended Results

Table B.1: Summary Statistics for Key Variables

Variable	Mean	SD	Min	Median	Max	Coef.Var
str	54,525.710	135,083.700	120	7,694	901,255	2.48
str_d	0	77,417.090	-412,062.400	4,457.900	488,283.200	–
gdp	34,748.180	27,502.770	2,094.470	27,287.780	133,711.800	0.79
inf	3.620	6.340	-2.100	1.950	72.310	1.75
unemp	8.040	4.850	0.790	6.810	31.100	0.60
fdi	11.190	59.620	-444.710	3.010	452.220	5.33
pop	19,125,948.000	24,637,513.000	420,028	7,651,375.000	85,325,965	1.29
n_mig	0	0.010	-0.140	0	0.040	4.18
w_ref	0	0.010	0	0	0.050	3.14
r_rem	2.490	3.670	0.030	1.220	23.080	1.48
p_rem	1.470	3.310	0.020	0.630	20.180	2.25
b_ind	4.470	0.860	1.780	4.450	6.620	0.19
c_corr	0.830	0.950	-1.180	0.730	2.400	1.14
g_eff	0.920	0.730	-0.720	1.020	2.210	0.79
rof	0.920	0.800	-0.920	1.020	2.120	0.87
ps_avt	0.530	0.640	-2.020	0.660	1.430	1.20
g_ind	0	1.880	-4.960	0.310	2.940	–
covid	0.250	0.430	0	0	1	1.73
invasion	0.170	0.370	0	0	1	2.24

Note: Summary statistics for all key variables used in the analysis, including mean, standard deviation, minimum, median, maximum, and coefficient of variation. Large coefficient of variation values are replaced with "–". The table highlights substantial heterogeneity in STR counts and macroeconomic indicators across countries and years.

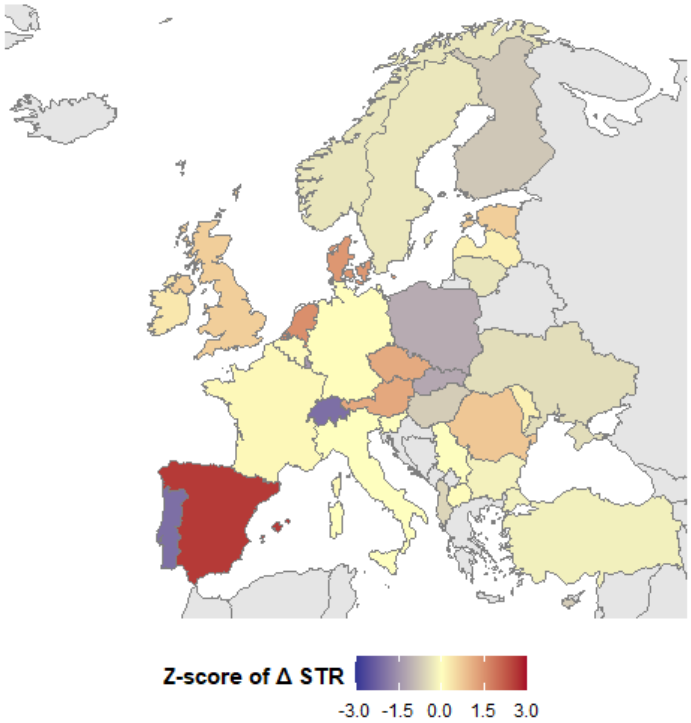

Figure B.1: Annual change in z-score of STRs by country, 2020

Note: In 2020, z-scores were largely unchanged across Europe, reflecting stable reporting.

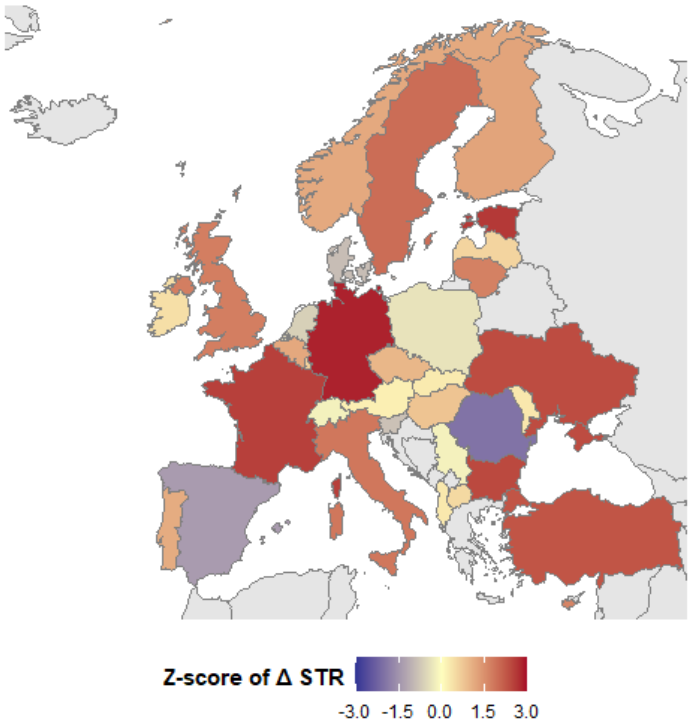

Figure B.2: Annual change in z-score of STRs by country, 2021

Note: The year 2021 saw the most significant positive shifts in STR reporting across Europe, as indicated by higher z-score values.

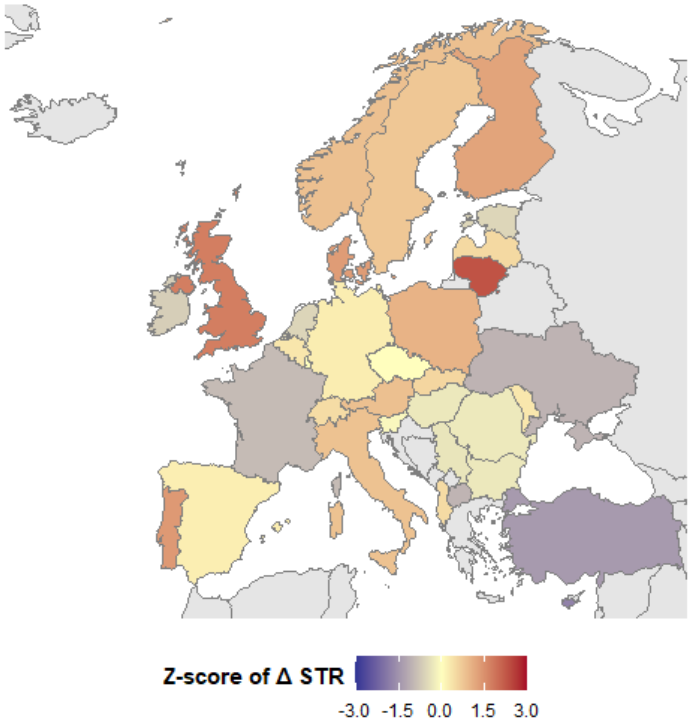

Figure B.3: Annual change in z-score of STRs by country, 2022
Note: In 2022, there was a slight increase in STR z-scores in Scandinavia.

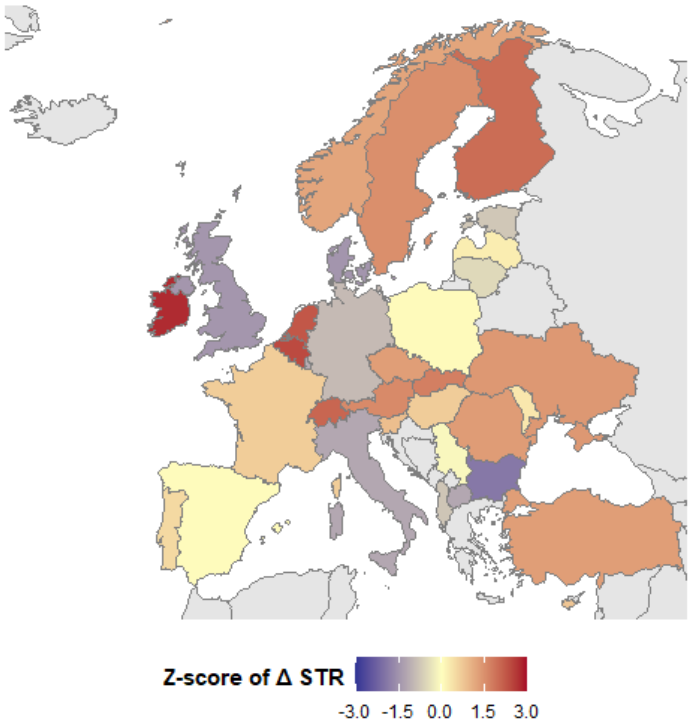

Figure B.4: Annual change in z-score of STRs by country, 2023
Note: In 2023, positive changes in STR z-scores were most notable in Scandinavia and Eastern Europe.

Table B.2: Correlation Matrix (Pearson above diagonal, Spearman below diagonal)

	str	str_d	b_ind	g_ind	c_corr	g_eff	ps_avt	rof	gdp	pop	inf	unemp	fdi	n_mig	r_rem	p_rem	w_ref	covid	invasion
str	1	0.573	0.055	-0.082	-0.001	-0.082	-0.204	-0.041	-0.009	0.396	0.243	-0.195	-0.064	-0.129	0.221	-0.055	-0.020	0.125	0.114
str_d	-0.040	1	-0.033	-0.025	-0.039	-0.056	0.042	-0.030	-0.006	0.015	0.090	0.016	0.006	-0.126	0.101	-0.016	-0.203	0	0
b_ind	-0.057	0.037	1	-0.464	-0.426	-0.414	-0.462	-0.452	-0.159	0.283	0.173	0.200	0.061	-0.129	0.355	0.146	-0.152	-0.179	-0.165
g_ind	0.315	-0.100	-0.396	1	0.962	0.977	0.833	0.987	0.792	-0.161	-0.379	-0.356	0.001	0.440	-0.623	0.261	-0.002	-0.027	-0.026
c_corr	0.388	-0.115	-0.418	0.977	1	0.960	0.677	0.964	0.820	-0.030	-0.291	-0.326	-0.041	0.407	-0.607	0.253	0.007	-0.002	0.00004
g_eff	0.339	-0.134	-0.363	0.981	0.965	1	0.731	0.972	0.789	-0.082	-0.340	-0.294	-0.010	0.421	-0.640	0.239	-0.025	-0.044	-0.034
ps_avt	0.024	0.006	-0.332	0.805	0.716	0.741	1	0.770	0.581	-0.435	-0.476	-0.353	0.075	0.396	-0.460	0.267	-0.002	-0.037	-0.052
rof	0.347	-0.125	-0.397	0.988	0.970	0.971	0.761	1	0.776	-0.101	-0.340	-0.372	-0.010	0.435	-0.625	0.231	0.014	-0.021	-0.017
gdp	0.431	-0.137	-0.281	0.912	0.914	0.907	0.698	0.904	1	-0.082	-0.192	-0.343	-0.067	0.420	-0.439	0.555	0.024	0.109	0.088
pop	0.456	-0.057	0.186	-0.066	0.002	-0.017	-0.275	-0.022	0.031	1	0.222	0.059	-0.108	-0.021	-0.217	-0.212	-0.091	0.003	0.002
inf	0.135	-0.187	0.057	-0.306	-0.272	-0.313	-0.301	-0.280	-0.204	0.097	1	-0.040	-0.069	-0.049	0.151	-0.064	0.371	0.443	0.514
unemp	-0.233	0.108	0.162	-0.342	-0.313	-0.279	-0.360	-0.341	-0.357	0.020	-0.219	1	-0.003	-0.362	0.059	-0.155	-0.217	-0.188	-0.160
fdi	-0.228	0.001	0.040	-0.091	-0.115	-0.122	0.030	-0.115	-0.141	-0.340	-0.040	0.098	1	0.159	-0.054	-0.061	-0.062	-0.063	-0.100
n_mig	0.252	-0.169	-0.169	0.604	0.622	0.589	0.507	0.603	0.703	-0.036	-0.024	-0.400	-0.017	1	-0.460	0.261	0.237	0.081	0.096
r_rem	-0.447	0.100	0.212	-0.570	-0.609	-0.600	-0.399	-0.586	-0.650	-0.335	0.115	0.170	0.125	-0.501	1	0.047	0.015	-0.043	-0.038
p_rem	-0.126	-0.017	0.064	0.326	0.269	0.310	0.362	0.289	0.313	-0.416	-0.008	-0.405	0.092	0.264	0.204	1	0.017	0.002	0.006
w_ref	0.189	-0.257	-0.368	0.494	0.502	0.465	0.394	0.506	0.544	-0.021	0.186	-0.411	-0.120	0.516	-0.293	0.356	1	0.515	0.666
covid	0.162	-0.261	-0.182	-0.040	-0.008	-0.047	-0.079	-0.032	0.114	0.009	0.594	-0.215	0.039	0.194	-0.054	0.054	0.463	1	0.775
invasion	0.134	-0.234	-0.171	-0.036	-0.004	-0.037	-0.094	-0.025	0.095	0.009	0.578	-0.202	-0.052	0.216	-0.045	0.056	0.592	0.775	1

Note: Pearson correlation coefficients are reported above the diagonal, Spearman coefficients below. Strong correlations are observed among governance variables (*c_corr*, *g_eff*, *ps_avt*, *rof*), which were addressed by constructing the composite *g_ind* index via principal component analysis. Other pairwise correlations are generally low to moderate, indicating limited multicollinearity elsewhere.

Table B.3: ADF Test Results for Stationarity

Variable	Test Statistic	p-value	Stationary
str	-2.665	0.296	No
d_str	-8.323	0.010	Yes
b_ind	-4.178	0.010	Yes
g_ind	-5.699	0.010	Yes
c_corr	-5.547	0.010	Yes
g_eff	-5.614	0.010	Yes
ps_avt	-4.960	0.010	Yes
rof	-5.858	0.010	Yes
gdp	-5.224	0.010	Yes
pop	-3.944	0.012	Yes
inf	-5.561	0.010	Yes
unemp	-5.566	0.010	Yes
fdi	-8.535	0.010	Yes
n_mig	-6.235	0.010	Yes
r_rem	-5.690	0.010	Yes
p_rem	-4.817	0.010	Yes
w_ref	-9.208	0.010	Yes
covid	-19.724	0.010	Yes
invasion	-17.018	0.010	Yes

Note: Augmented Dickey-Fuller (ADF) test results for all model variables. All series except for *str* are stationary at the 5% significance level. The detrended variable *str_d* was constructed to address the non-stationarity in *str*.

Table B.4: Variance Inflation Factors (VIF) for Model Regressors

Variable	**VIF**
lag(log(gdp))	4.35
inf	1.70
lag(log(unemp))	1.59
lag(r_rem)	3.73
lag(log(p_rem))	1.85
fdi	1.07
n_mig	1.57
log(w_ref + 1e-06)	3.97
log(b_ind)	1.32
covid	2.60
lag(invasion)	4.62

Note: Variance inflation factors (VIF) for all model regressors. All values are below the common threshold of 5, indicating no problematic multicollinearity in the model.