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Assessing AML system effectiveness across jurisdictions using FATF compliance and risk-based metrics

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Abstract

Purpose – This paper aims to examine the gap between technical adherence to the Financial Action Task Force (FATF) recommendations and the actual effectiveness of anti-money laundering (AML) systems across jurisdictions. It specifically investigates how jurisdictions may bridge the gap between FATF technical compliance (TC) and actual AML effectiveness and evaluates the role of the risk-based approach (RBA) and national coordination mechanisms in improving performance.

Design/methodology/approach – The study uses secondary cross-sectional data covering 172 jurisdictions derived from FATF Mutual Evaluation Reports and the Basel AML Index (2024). Descriptive and regional analyses draw on the full jurisdictional coverage where data are available, while multivariate regression is estimated on a complete-case sample of 102 jurisdictions after merging external control variables and excluding missing observations. The analysis applies descriptive statistics, Pearson and Spearman correlations, a one-way analysis of variance and OLS regression with heteroskedasticity-robust standard errors, supported by standard diagnostic and robustness tests.

Findings – The results indicate that TC is positively associated with AML effectiveness, while the RBA also demonstrates a statistically significant positive relationship. In contrast, coordination mechanisms do not exhibit a significant effect after inclusion of structural controls. Economic and financial system characteristics, particularly GDP per capita and financial depth, are also significantly associated with AML outcomes. The extended model explains a substantial proportion of variation in AML effectiveness, and robustness checks confirm the stability of the core findings.

Originality/value – This study provides empirical evidence that effective AML systems require more than formal compliance with FATF standards. By examining the roles of risk-based implementation and institutional coordination across 172 jurisdictions, the paper adds new cross-jurisdictional evidence to the compliance–effectiveness debate and offers practical insights for regulators, especially in institutionally constrained environments.

Keywords AML, FATF, Technical compliance, Effectiveness, Risk-based approach, Basel index, Financial regulation

Paper type Research paper

1. Introduction

Money laundering (ML) has become one of the most persistent global challenges and continues to evolve in line with changes in the financial system and technology. It involves

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concealing the sources of illegal funds so that they appear legitimate, undermining financial integrity and allowing illegal businesses to grow further (Kamaruddin *et al.*, 2025; Honga *et al.*, 2025; Sultan *et al.*, 2025a).

As a countermeasure, this has led to the widespread implementation of anti-money laundering (AML) regimes across the world, most of them developed under the direction of the Financial Action Task Force (FATF), established in 1989 by the G7. The FATF's 40 Recommendations have become the recognized international standard for putting in place legal, regulatory and institutional frameworks to combat ML. Countries are evaluated through mutual evaluation reports (MERs) on two key dimensions: technical compliance (TC) and real-life effectiveness.

However, even with such international norms in place, many jurisdictions still face high levels of ML risk (Kamaruddin *et al.*, 2025). While formal compliance with FATF frameworks is often comprehensive, actual results in reducing ML threats differ widely across regions (Gikonyo, 2019). This creates an important question: is TC enough to ensure effective AML performance?

In this changing environment, developments in Risk, Regulatory and Compliance have given rise to Financial Technology (FinTech) and Regulatory Technology (RegTech) (Moncalvo *et al.*, 2025; Ramadhan, 2025; Halford *et al.*, 2025). These technologies have the potential to improve risk detection, automate compliance processes and reduce the burden on institutions. However, their effectiveness depends not only on technological capability but also on the adoption of adaptive controls such as the risk-based approach (RBA), which focuses on proportionality and contextual sensitivity.

Past empirical studies have not adequately addressed whether formal compliance is enough to guarantee operational success at an international level. While TC is generally seen as a necessary requirement, there are doubts about whether it is sufficient to deliver meaningful AML results. The FATF's shift in priorities in recent years, advising jurisdictions to apply simplified controls in low-risk situations and dedicate more resources to high-risk cases (Korpela, 2025; Sultan *et al.*, 2025b), reflects the principles behind the RBA.

Despite the global adoption of AML measures and the ongoing introduction of FinTech and RegTech solutions, significant questions remain about the real impact of these efforts. In particular, the gap between TC and actual effectiveness continues to challenge policymakers and enforcement bodies. Addressing this gap requires a deeper understanding of what drives successful AML performance beyond formal adherence to FATF standards.

The research therefore seeks to answer the central question:

How can jurisdictions bridge the gap between FATF technical compliance and actual AML effectiveness?

Unlike prior studies that focus primarily on conceptual debates, single-country settings or limited regional comparisons, this study provides a cross-jurisdictional empirical assessment across 172 jurisdictions using FATF- and Basel-derived indicators. By jointly examining TC, risk-based implementation and national coordination, the study offers a broader and more recent perspective on the compliance–effectiveness gap in AML governance.

The RBA may contribute to AML effectiveness by directing regulatory attention and resources toward areas with greater ML risk. In a purely rule-based system, jurisdictions may apply similar legal requirements across all sectors, even when levels of risk differ significantly. This can produce strong TC scores while the most serious risks remain insufficiently addressed. FATF Recommendation 1 seeks to address this problem by requiring jurisdictions to conduct national risk assessments, apply greater supervisory attention to higher-risk sectors and use simplified measures where risks are shown to be low (de Wit, 2007; Naheem, 2020). Jurisdictions with stronger RBA implementation may

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therefore achieve better AML outcomes because their regulatory efforts are directed toward the areas where they are most needed.

National coordination may also influence AML effectiveness. FATF Recommendation 2 requires relevant authorities to cooperate, share information and develop coordinated policies. Effective coordination may help reduce institutional fragmentation and ensure that legal and regulatory measures are implemented consistently across agencies.

To explore the central research question, the study focuses on five core objectives:

(1) To assess the level of TC with FATF standards across jurisdictions.

(2) To examine the association between TC and AML effectiveness.

(3) To analyse the role of the RBA (FATF Recommendation 1) in relation to AML effectiveness.

(4) To evaluate the role of national coordination mechanisms (FATF Recommendation 2) in relation to AML effectiveness.

(5) To compare regional patterns in AML compliance and effectiveness across jurisdictions.

2. Literature review

2.1 Evolution of anti-money laundering frameworks

The concept of AML systems has changed significantly in the last 30 years, moving away the more rule-based models characteristic of inflexible policies toward a risk-sensitive concept based on policy flexibility (Mallika and Ramasubramanian, 2025). Early versions of AML frameworks focused more on formalism i.e. on the application of prescriptive measures without attention to important differences in individual institutions and jurisdictions. Such mechanical arrangements that focus on enforcing compliance and are static in nature frequently became overwhelmed when it came to adapting toward financial crimes becoming more and more sophisticated and when it comes to unevenly distributed risks among financial institutions (de Wit, 2007).

There was also a paradigm change when the FATF advanced and institutionalized the RBA through its successive recommendations and sector-specific guidance, enabling jurisdictions to adjust their AML policies depending on sector-specific and case-specific risks. This development, which gained significant momentum through FATF guidance published around 2007–2009 and later consolidated in the 2012 Recommendations, represented a structural departure from one-size-fits-all compliance models (de Wit, 2007; Naheem, 2020). The RBA facilitates a regulatory *laissez-faire* approach to risk regulation in lower-hazard environments and the facilitation of increased oversight and enforcement in the vice-versa. The aim of this policy innovation was to represent a harmonization between the principles of AML, and the growing liquidity of money, especially in relation to the occurrence of digital payment platforms, cross-border banking and decentralized financial networks (Fathi *et al.*, 2025; Halford *et al.*, 2025; Ramadhan, 2025).

Despite the strong traction that the RBA has gained in international AML policymaking and regulatory discourse, empirical assessment of its implementation at the global level remains limited. A key methodological challenge in evaluating AML effectiveness lies in the frequent conflation of outputs and outcomes, which makes it difficult to assess whether AML frameworks generate meaningful real-world effects (Pol, 2020). This issue is especially important in cross-jurisdictional research, where formal legal compliance may be easier to observe than actual institutional performance. As a result, there remains a clear evidence gap

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regarding how far risk-based implementation contributes to AML effectiveness across jurisdictions with different governance capacities and institutional conditions.

2.2 Technical compliance and its limitations

TC refers to the extent to which a jurisdiction aligns its legal, regulatory and institutional framework with the FATF 40 Recommendations. Although this dimension is important, it primarily captures the formal existence of laws, rules and institutional arrangements rather than how effectively they operate in practice. Earlier studies also noted that AML systems often show weak measurable outcomes despite increasingly strong legal frameworks, with enforcement receiving less attention than legislation (Levi and Reuter, 2006). A related methodological concern is that AML effectiveness is often assessed through indicators that conflate outputs and outcomes, making it difficult to determine whether formal compliance produces meaningful real-world results (Pol, 2020). This conflation is not incidental – it reflects a broader pattern in quantitative AML research where compliance scores, report volumes and risk ratings are routinely treated as proxies for effectiveness without distinguishing what each actually measures. Outputs capture what a system produces – reports filed, laws passed, institutions established – while outcomes reflect whether any of this translates into a measurable reduction in ML risk. A jurisdiction can score well on the former while making little demonstrable progress on the latter. In addition, Ferwerda (2009) demonstrates from a cost-benefit perspective that AML regimes can impose significant compliance costs on institutions while generating limited measurable enforcement returns, suggesting a structural inefficiency in how compliance is designed and evaluated. Taken together, these studies indicate that strong TC should not automatically be interpreted as evidence of effective AML performance.

The effect of this disconnect has been characterized as a check-the-box type of culture, where the jurisdictions have satisfied the formal requirements that ensure the measures are simply enforced but not provided substantively (Ai, Broome and Yan, 2010; Mekpor, Aboagye and Welbeck, 2018). It is worth noting that high-income countries tend to place at the top of the list because of having access to legal expertise and institutional resources, but even then, they do not perform well in areas of innovation and ability to respond to new patterns of laundering (Castelao-López *et al.*, 2025; Pavlidis, 2025; Alsuwailem and Saudagar, 2020). Although TC is an underlying element, it is not in itself a sufficient measure of an effective AML regime (Dote-Pardo and Severino-González, 2025; Mokone, 2025). This confirms the need to examine how compliance translates into actual and traceable AML results – and why the output–outcome distinction is particularly important when interpreting cross-jurisdictional findings such as those presented in this study.

2.3 Role and integration of risk-based approach in anti-money laundering systems

Academic and policy support has risen behind the RBA as being more adaptable, more cost-effective, especially in resource-constrained jurisdictions. One of the ways that RBA advances proportionality is through giving jurisdictions and institutions the freedom to adjust their AML measures to the extent that the respective risks are identified (Sultan *et al.*, 2025b; Moncalvo *et al.*, 2025). Specifically, FATF Recommendations 1 and 2 request jurisdictions to perform the risk identification, preparation of mitigating measures and effective coordination among agencies.

However, implementing the RBA in practice remains difficult. Many emerging economies lack the institutional capacity needed to apply RBA effectively, while rigid regulatory structures may limit its flexibility in practice. In addition, RBA does not operate in isolation. Its success depends on strong inter-agency cooperation, timely technological

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support (Halford *et al.*, 2025; Ramadhan, 2025) and reliable regulatory coordination (Naheem, 2020; de Wit, 2007). Kurum (2023) further notes that although RegTech solutions can support RBA implementation, especially in transaction monitoring and customer due diligence, their adoption remains uneven across jurisdictions. As a result, an important gap remains in understanding how far RBA can be scaled and translated into effective AML outcomes across different institutional settings. This study seeks to address that gap.

2.4 Regional case studies and variations

Real-life experiences among different regions identify that there are significant geographical gaps in both the compliance and effectiveness of AML. As an instance, Australia has been quite capable in serving as a positive example of conformity and success in embodying the RBA guarantees and inter-agency coordination, making it rated high in both compliance and operational efficiency. Conversely, although well-developed legal frameworks are present in Japan, it has been criticized as tending to underutilize financial intelligence in its enforcement activities. On the same note, despite Russia classifying as FATF-compliant, the politicization of the mechanisms involved has jeopardized the operative credibility of the AML system within the country (Şeker, 2025).

An example of its structural limitations in the implementation of AML can be evidenced in the case of Nigeria and Pakistan. In both countries, institutional weaknesses, limited enforcement capacity and budgetary constraints make it difficult to translate formal legal compliance into effective enforcement (Channa *et al.*, 2025; Mokone, 2025; Gikonyo, 2019). Dote-Pardo and Severino-González (2025) similarly identify that emerging economies consistently show wider gaps between formal compliance scores and actual AML outcomes, particularly where governance quality and institutional maturity remain low. Such regional disparities reveal that the effectiveness of AML is dependent not just on legal compliance but also on the quality of governance, age of institutions and will power.

This geographic variation highlights the need for comparative, data-driven research to assess whether harmonized international standards have led to meaningful improvements in AML practice across jurisdictions. Addressing this issue is a central aim of the present study.

2.5 Research gaps and theoretical foundations

Although the normative dominance of the FATF is undeniable, the link between TC, the application of RBA and AML effectiveness is an under-investigated phenomenon on an empirical basis. The majority of the available literature is either conceptual (Arner *et al.*, 2015) or insightful on case-wise nature (Ai, 2012); or limited in terms of geographical scope (Mekpor, Aboagye and Welbeck, 2018). More recently, Zhang *et al.* (2023) developed a composite AML index using machine-learning techniques across several countries. Although the method was innovative, AML effectiveness was treated as a single combined measure. As a result, the separate contributions of TC, risk-based implementation and national coordination were not clearly identified. In addition, the weighting and influence of variables within machine-learning models can be difficult for regulators and policymakers to interpret, which may limit the practical value of the findings. This points to the need for more transparent and disaggregated empirical models that examine each dimension of AML governance separately.

A further issue in the literature concerns how AML performance is measured and interpreted. Composite indicators and expert-based assessments are useful for comparing jurisdictions, but they may also be affected by subjective judgements, differences in country coverage and decisions about how individual measures are combined. AML effectiveness should therefore be interpreted carefully, particularly when TC is treated as equivalent to

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practical or operational outcomes. These limitations highlight the importance of clear variable construction, normalisation and interpretation. The present study addresses these concerns by using standardised indicators derived from FATF and the Basel AML Index across 172 jurisdictions, while treating TC, the RBA and national coordination as separate explanatory variables.

A summary of relevant previous studies is presented in Table 1, highlighting their research focus, methodological approaches and key findings.

3. Methodology

3.1 Research design

This study adopts a quantitative research approach to examine the relationship between TC with FATF standards and the effectiveness of AML systems across jurisdictions. Given the cross-country nature of the analysis, a comparative and cross-sectional research design is used to explore variations in compliance and effectiveness across 172 jurisdictions.

To structure the research design, the study follows the Research Onion framework, which outlines the philosophical stance, methodological approach and analytical techniques used in the study. The research is grounded in a positivist philosophy, which assumes that an objective social reality exists and can be examined through empirical observation and statistical analysis. This approach is appropriate for analyzing AML effectiveness using observable indicators across jurisdictions (Mekpor, Aboagye and Welbeck, 2018; Mallika and Ramasubramanian, 2025).

The study adopts a deductive approach, where theoretical perspectives related to regulatory compliance and risk governance are tested using empirical data (Arner *et al.*, 2015). A quantitative strategy is used to identify patterns and relationships between TC, the RBA, coordination mechanisms and AML effectiveness across jurisdictions. The time horizon is cross-sectional, with data collected for a single period, allowing comparison across jurisdictions at a specific point in time (Kurum, 2023).

While the Research Onion provides a useful structure for the overall design, the empirical strength of the study lies in the transparent construction of variables, scale harmonization and statistical testing procedures described in the following sections.

3.2 Data sources

The study relies on secondary, cross-sectional data obtained from publicly available sources. The primary AML-related variables are derived from FATF MERs and the Basel AML Index (2024), which provide internationally comparable indicators of compliance and effectiveness. The merged source data set covers 172 jurisdictions. Four structural control variables were sourced from internationally recognized databases: GDP per capita (PPP) from the World Bank WDI; Rule of Law from the World Bank WGI; CPI from Transparency International; and financial depth from the World Bank WDI. Country identifiers were aligned across all sources using ISO3 codes.

The data set covers 172 jurisdictions and incorporates expert-based evaluations, standardised scoring and risk assessments. These data sources are widely used in academic and policy research and draw on information from globally recognised institutions, including the World Bank, Transparency International and the World Economic Forum. As such, they provide a consistent basis for evaluating AML system performance across jurisdictions.

Secondary data was selected to ensure broad geographic coverage and comparability across diverse legal and institutional environments. After merging all variables and removing observations with missing values in any regression variable, 102 jurisdictions remained in the complete-case sample used for correlation matrices including controls, regression

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Table 1. Summary of key prior studies on AML compliance and effectiveness

Author(s)	Focus	Methodology	Key findings
Levi and Reuter (2006)	Effectiveness of AML policy	Policy review	AML systems often show weak measurable outcomes despite strong legal frameworks. Enforcement tends to receive much less attention than legislation
Pol (2020)	AML effectiveness measurement	Conceptual analysis	AML effectiveness is difficult to assess because outputs and outcomes are often conflated. Compliance activity does not necessarily mean real impact
Ferwerda (2009)	Cost-benefit of AML policy	Economic analysis	AML regimes impose substantial compliance costs on institutions compared with the observable enforcement returns, which raises concerns about structural efficiency
Mekpor, Aboagye and Welbeck (2018)	AML compliance determinants	Quantitative study	Institutional factors, such as governance quality and regulatory capacity, significantly influence AML performance across FATF member states
Alsuwailem and Saudagar (2020)	Comparative AML systems	Systematic literature review	Enforcement gaps continue despite growing legal alignment. Technical compliance alone does not guarantee substantive outcomes
Naheem (2020)	Inter-agency coordination	Theoretical analysis	Coordination among agencies is essential for AML effectiveness, but in practice it is often institutionally difficult to operationalize
Kurum (2023)	RegTech and AML	Policy analysis	RegTech solutions can strengthen AML compliance, especially in transaction monitoring, although implementation remains uneven across jurisdictions
Zhang *et al.* (2023)	AML index construction	Machine learning (LASSO and random forests)	Composite AML indices derived from mutual evaluation reports can improve measurement granularity, but they also raise concerns about subjectivity and variable selection

Source(s): Authors' own work

estimation, multicollinearity testing and residual diagnostics. This distinction is maintained throughout the results section so that sample sizes are explicit for each analysis. The reduction in the sample from 172 to 102 jurisdictions was caused by the availability of external control variables rather than by any deliberate exclusion criteria. Among the 70 excluded jurisdictions, 65 lacked data on financial depth. These data were unavailable in the World Bank's World Development Indicators for several smaller, lower-income and island

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economies. The remaining five jurisdictions had missing values for one or more of the other control variables.

To assess whether the missing data may have introduced systematic differences between the two groups, Table 2 compares the main AML variables for the retained and excluded jurisdictions. Overall, the two groups show broadly similar results across the key measures. The excluded jurisdictions have a slightly higher average AML effectiveness score than the retained group (7.52 compared with 7.03) and marginally higher TC (3.49 compared with 3.33). This suggests that jurisdictions were not excluded because of weaker performance on the main outcome. Average scores for the RBA and national coordination are also relatively close across the two groups.

Some regional imbalance is nevertheless present in the final regression sample. Sub-Saharan Africa has the highest proportion of excluded jurisdictions at 54%, followed by the Middle East and North Africa at 50% and East Asia and the Pacific at 48%. This underrepresentation appears to reflect limitations in the availability of structural and economic data rather than clear differences in AML governance performance.

Overall, the comparison does not indicate strong evidence that the results are driven by systematic selection based on AML effectiveness. However, the regional imbalance remains an important limitation. The findings should therefore be interpreted as applying to the complete-case sample and may not be fully generalisable to jurisdictions for which structural data were unavailable.

3.3 Variables and measurement

The analysis is based on eight variables, summarised in Table 3. AML Effectiveness (EFF) serves as the dependent variable, while TC, RBA implementation (R.1) and Coordination Mechanisms (R.2) are the primary independent variables. Four structural controls are also included: GDP per capita PPP (GDP_z), Rule of Law (RoL_z), CPI score (CPI_z) and financial sector depth (FinDepth_z), each standardised to z-scores.

To support transparency and replicability, Appendix presents a mapping table showing how each Basel AML Index sub-pillar and FATF MER dimension relates to the four analytical constructs used in this study. As the analysis relies on externally validated indicators rather than a newly developed latent scale, measurement validity is assessed through consistency of data sources, harmonization of measurement scales and alignment with established FATF definitions. Internal psychometric consistency is therefore not the main basis for evaluating validity in this study.

Table 2. Comparison of retained and excluded jurisdictions (mean ± SD)

Variable	Retained ($n = 102$)	Excluded ($n = 70$)
AML effectiveness	7.03 ± 1.86	7.52 ± 1.93
Technical compliance	3.33 ± 1.28	3.49 ± 1.53
RBA Score (R.1)	1.87 ± 0.59	1.76 ± 0.65
Coordination Score (R.2)	2.19 ± 0.70	2.09 ± 0.76
Rule of law	0.17 ± 0.90	0.06 ± 1.06
CPI score	47.20 ± 17.92	44.28 ± 21.76

Note(s): Financial depth data were unavailable for 65 of the 70 excluded jurisdictions (93%), making it the primary driver of sample reduction
Source(s): Authors' own work

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Table 3. Description of variables and measurement scales

Variable	Description	Scale/Range	Source
Technical compliance (TC)	Legal/regulatory adherence to FATF recommendations	0 (low) – 10 (high)	FATF MERs; basel AML index
AML effectiveness (EFF)	Practical success in detecting and mitigating ML	0 (low) – 10 (high)	FATF MERs; basel AML index
FATF R.1 (RBA Score)	Implementation of the risk-based approach	0 (none) – 3 (full)	FATF MERs
FATF R.2 (Coordination)	National coordination and inter-agency collaboration	0 (none) – 3 (full)	FATF MERs
GDP per capita PPP (GDP_z)	Economic development level, z-score standardized	Continuous (z-score)	World Bank WDI — NY. GDP.PCAP.PP.CD, 2023
Rule of law (RoL_z)	Governance quality estimate, z-score standardized	Continuous (z-score)	World Bank WGI — RL. EST, 2023
CPI score (CPI_z)	Corruption perceptions index, z-score standardized	Continuous (z-score)	Transparency International CPI, 2024
Financial depth (FinDepth_z)	Domestic credit to private sector (% GDP), z-score standardized	Continuous (z-score)	World Bank WDI — FS. AST.PRVT.GD.ZS, 2022

Source(s): Authors' own work

The variables are measured on different scales. TC and AML effectiveness are reported on a scale from 0 to 10, whereas Recommendations 1 and 2 are scored from 0 to 3. To make the estimated effects easier to compare, all independent variables and structural control variables were standardized as z-scores before the regression analysis. This transformation expresses each variable in terms of its distance from the sample mean, measured in standard deviations. The original direction of the measures was retained, meaning that higher values consistently indicate stronger compliance, implementation, coordination or effectiveness.

3.4 Statistical methods

The analysis is conducted in three stages. First, descriptive statistics summarize the distribution of the main AML indicators across the available jurisdictional coverage. Where only core AML variables are used, the broader data set coverage is retained; where external controls are required, analyses use the complete-case sample ($n = 102$).

Second, correlation analysis is performed to examine bivariate relationships. Pearson coefficients assess linear associations, and Spearman rank correlations are used as a nonparametric robustness check given the bounded nature of several indicators. The extended correlation analysis including structural controls is based on the complete-case sample of 102 jurisdictions.

In addition to Pearson correlations, Spearman rank correlation is also used as a robustness check. This nonparametric approach helps to verify the consistency of relationships, particularly given the bounded nature of the underlying AML indicators. The use of both parametric and nonparametric correlation measures strengthens the reliability of the findings.

Third, a multiple linear regression model is used to examine the relationship between the predictors and AML effectiveness. The full model is specified as:

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$$EFF = \beta_0 + \beta_1(TC) + \beta_2(R.1) + \beta_3(R.2) + \beta_4(GDPz) + \beta_5(RoLz) + \beta_6(CPIz) + \beta_7(FinDepthz) + \varepsilon \quad (1)$$

where *EFF* is AML effectiveness; *TC* is technical compliance; *R*.1 and *R*.2 are RBA and coordination scores; *GDP_z*, *RoL_z*, *CPI_z* and *FinDepth_z* are the four standardized control variables; β_0 is the intercept; β_1–β_7 are estimated slope coefficients; and ε is the error term.

To improve comparability across different measurement scales, the independent variables and structural controls were standardized prior to estimation, while AML Effectiveness was retained in its original interpreted scale as the dependent variable.

The regression results are presented using estimated coefficients, HC3 robust standard errors, *t*-values, *p*-values and 95% confidence intervals. Model performance is evaluated using R^2 and adjusted R^2. As the Breusch–Pagan test indicated the presence of heteroskedasticity, all statistical inferences are based on HC3 robust standard errors.

To ensure the robustness and validity of the regression model, several diagnostic tests were conducted. Multicollinearity was assessed using variance inflation factors (VIF), where values below conventional thresholds indicate no serious multicollinearity concerns. The normality of the residuals was assessed using the Jarque–Bera test and visual inspection of Q–Q plots. The Breusch–Pagan test was used to examine whether the variance of the residuals remained constant across observations.

The Breusch–Pagan test indicated the presence of heteroskedasticity. To address this issue and ensure reliable statistical inference, the regression model was estimated using robust standard errors (HC3). This adjustment corrects for nonconstant variance in the error terms and improves the accuracy of hypothesis testing.

All data processing, statistical modelling and diagnostic testing were conducted using Python. Inferential tests were evaluated at the 5% significance level ($\alpha = 0.05$), in line with common practice in quantitative social science and regulatory research.

Overall, the analytical approach integrates descriptive, correlational and regression-based methods to provide a comprehensive assessment of the relationships between TC, risk-based implementation, coordination mechanisms and AML effectiveness across jurisdictions.

4. Results

4.1 Descriptive statistics and general trends

The analysis draws on a merged data set covering 172 jurisdictions from FATF and Basel sources. Table 4 reports descriptive statistics for the complete-case sample used in the multivariate analysis ($n = 102$), after adding the four structural control variables and excluding jurisdictions with missing observations in any regression variable.

The complete-case sample used for regression analysis comprises $n = 102$ jurisdictions – those with valid data across all eight variables. On a normalized scale of 0–10, the global average for AML Effectiveness was 7.025 (SD = 1.847), while TC averaged 3.330 (SD = 1.274). The average RBA Score (R.1) was 1.873 (out of 3), and the average Coordination Score (R.2) stood at 2.186, indicating that only a limited number of jurisdictions reached full implementation (3 / 3).

Among the structural controls, GDP per capita (PPP) ranged widely, with a z-score spanning −1.017–3.709, reflecting the heterogeneous income composition of the sample. Rule of Law (z: −1.621–1.918), CPI (z: −1.669–2.276) and financial depth (z: −1.233–3.802) similarly show substantial cross-jurisdictional variation, confirming the importance of including these controls to account for structural differences.

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Table 4. Descriptive statistics of key variables (complete-case sample, $n = 102$)

Variable	Mean	SD	Min.	Max.
AML effectiveness (EFF)	7.025	1.847	3.030	10.000
Technical compliance (TC)	3.330	1.274	0.670	8.000
RBA Score (R.1)	1.873	0.592	0.000	3.000
Coordination (R.2)	2.186	0.700	1.000	3.000
GDP per capita PPP (z)	−0.003	0.941	−1.017	3.709
Rule of law (z)	0.041	0.930	−1.621	1.918
CPI score (z)	0.052	0.926	−1.669	2.276
Financial depth (z)	−0.002	1.018	−1.233	3.802

Source(s): Authors' own work

These results reinforce the critique of the "compliance illusion," where legal frameworks exist on paper but do not translate into real risk reduction or operational effectiveness (Naheem, 2020; Ai *et al.*, 2010).

4.2 Visual analysis (boxplots and histograms)

Visual analysis was undertaken to examine the distribution of TC and AML effectiveness across jurisdictions. These visual summaries refer to the broader jurisdictional coverage available for the core AML variables, whereas the regression diagnostics later in the paper refer to the complete-case sample ($n = 102$).

Figure 1 presents a boxplot of TC. The distribution shows a moderate interquartile range with several outliers, indicating that while many jurisdictions cluster around the average level of compliance, some jurisdictions significantly deviate from this pattern. This supports earlier findings that legal alignment with FATF standards is uneven across jurisdictions (Ai, 2012).

Figure 2 presents the histogram of AML Effectiveness Scores. The distribution shows two main clusters, one between 3 and 4 and another between 5 and 7, with relatively few jurisdictions achieving very high effectiveness scores above 8. This indicates that high levels of operational effectiveness remain relatively rare.

Taken together, these figures indicate that compliance levels are relatively clustered, while effectiveness levels display greater variation. This difference suggests that alignment with FATF standards does not automatically translate into strong operational outcomes. The findings support the central argument of the study that legal conformity, while important, is not sufficient on its own to ensure effective AML performance, particularly in the absence of strong coordination and risk-based implementation (Mekpor *et al.*, 2018; Kurum, 2023).

4.3 Correlation analysis

To assess linear relationships between variables, a Pearson correlation matrix was developed for the complete-case sample ($n = 102$). The results are presented in Table 5.

TC showed a moderate positive association with AML Effectiveness (EFF), whereas RBA Implementation (R.1) and Coordination Mechanisms (R.2) were negatively associated with EFF at the bivariate level. Among the control variables, GDP_z, RoL_z, CPI_z and FinDepth_z also showed negative correlations with EFF.

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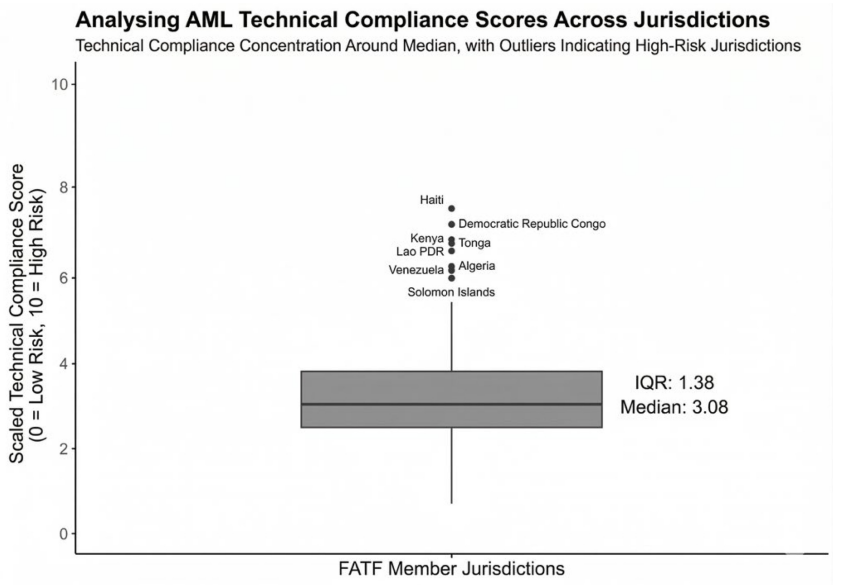

Figure 1. Boxplot of technical compliance scores
Source: Authors' own work

A particularly strong positive correlation was observed between Rule of Law and CPI (r = 0.944), indicating substantial overlap between these governance-related measures and a potential multicollinearity concern. This pattern was examined more formally in the regression diagnostics using VIF.

4.4 A one-way analysis of variance results

A one-way analysis of variance (ANOVA) was conducted to assess whether AML effectiveness differs significantly across global regions using the core AML data set covering 172 jurisdictions. The results indicate that regional differences are statistically significant ($F = 31.83$, $p < 0.001$), suggesting that institutional and contextual factors may play an important role in shaping AML outcomes.

As shown in Figure 3, the global average TC score is 3.39. Sub-Saharan Africa (4.43), East Asia and Pacific (3.81) and South Asia (3.53) record the highest scores, all above the global mean. In contrast, Latin America and the Caribbean (3.10), Middle East and North Africa (2.92), Europe and Central Asia (2.85), North America (2.53) and the Unlisted category (2.44) fall below the global average.

Figure 4 presents the regional distribution of AML effectiveness, where higher values indicate stronger performance. The global average AML effectiveness score is 7.23. Sub-Saharan Africa (9.44) and South Asia (8.79) record the highest regional effectiveness scores, while North America (4.44) and Europe and Central Asia (5.80) show comparatively lower effectiveness outcomes. These patterns indicate that regional variation in AML effectiveness does not map neatly onto formal compliance levels alone, reinforcing the importance of institutional capacity, implementation quality and broader structural context in shaping AML outcomes.

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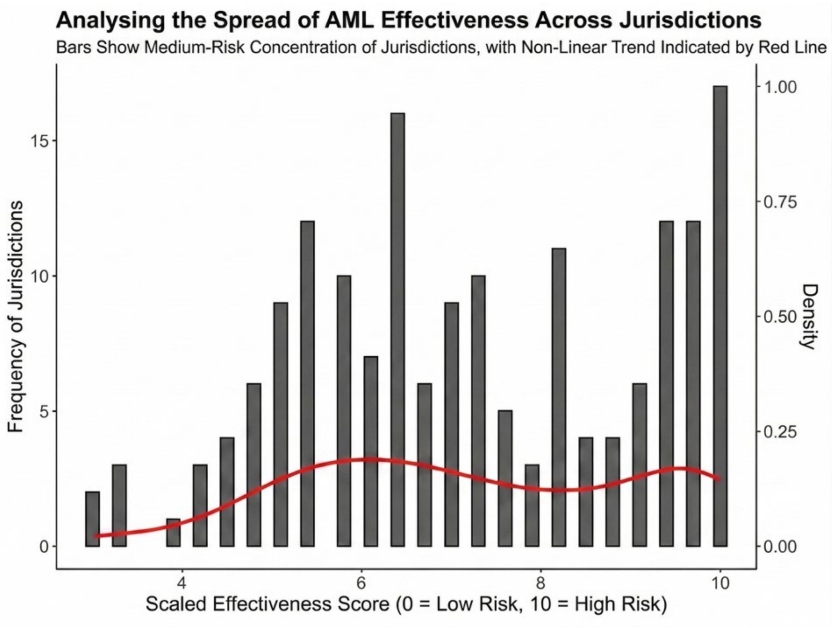

Figure 2. Histogram of AML effectiveness scores
Source: Authors' own work

Table 5. Pearson correlation matrix of key AML variables (complete-case sample with controls, $n = 102$)

Variable	TC	R.1	R.2	EFF	GDP_z	RoL_z	CPI_z	FinDepth_z
Technical compliance (TC)	1.000	−0.639	−0.583	0.573	−0.544	−0.499	−0.446	−0.362
RBA Score (R.1)	−0.639	1.000	0.441	−0.194	0.276	0.289	0.271	0.119
Coordination (R.2)	−0.583	0.441	1.000	−0.433	0.354	0.346	0.306	0.278
AML effectiveness (EFF)	0.573	−0.194	−0.433	1.000	−0.648	−0.562	−0.502	−0.507
GDP per capita PPP (GDP_z)	−0.544	0.276	0.354	−0.648	1.000	0.822	0.761	0.485
Rule of law (RoL_z)	−0.499	0.289	0.346	−0.562	0.822	1.000	0.944	0.568
CPI score (CPI_z)	−0.446	0.271	0.306	−0.502	0.761	0.944	1.000	0.522
Financial depth (FinDepth_z)	−0.362	0.119	0.278	−0.507	0.485	0.568	0.522	1.000

Source(s): Authors' own work

The comparison of regional patterns highlights substantial cross-regional variation in both compliance and effectiveness. These patterns suggest that formal compliance does not automatically translate into uniform operational performance across regions.

Overall, the ANOVA results reinforce the broader argument that AML effectiveness is shaped not only by legal compliance, but also by institutional capacity, governance quality and the practical implementation of AML frameworks.

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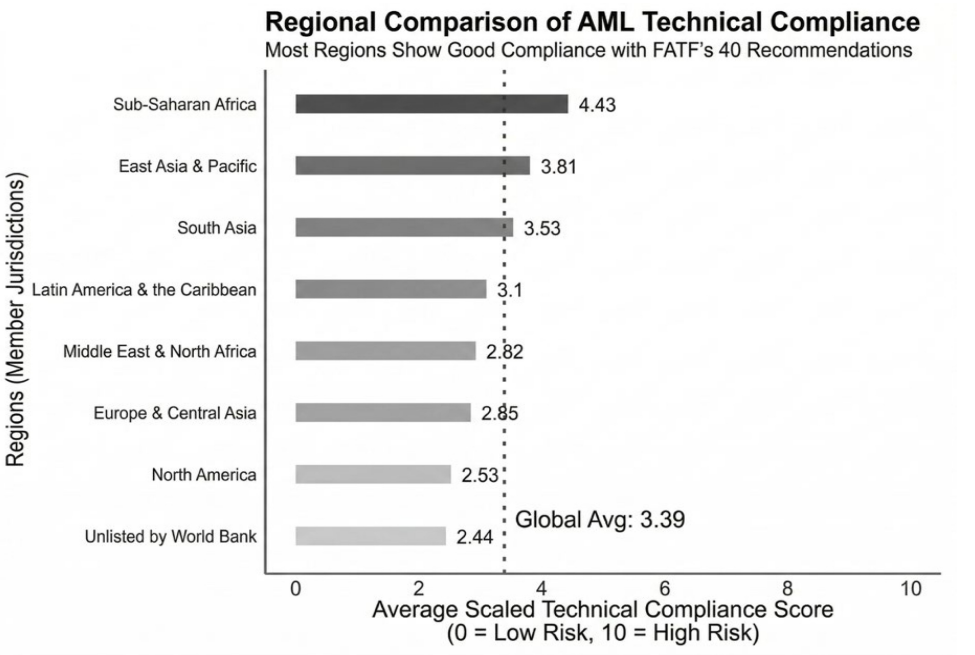

Figure 3. Regional distribution of technical compliance scores
Source: Authors' own work

4.5 Regression findings

To identify the most significant predictors of AML effectiveness, a multiple linear regression analysis was conducted using OLS with HC3 heteroskedasticity-robust standard errors. TC, RBA (R.1), Coordination Mechanisms (R.2) and four structural controls were specified as independent variables. The regression was estimated on the complete-case sample of 102 jurisdictions.

The overall regression model was statistically significant ($F = 15.62$, $p < 0.001$, $n = 102$). The model produced an R^2 of 0.562 and an adjusted R^2 of 0.530, implying that about 56% of the variation in AML effectiveness is explained by the full specification.

The detailed regression results are presented in Table 6.

As shown in Table 6, TC exhibits a positive and statistically significant association with AML effectiveness ($\beta = 0.367$, $p = 0.001$). This indicates that jurisdictions with higher levels of formal compliance with FATF standards tend to achieve stronger AML outcomes. The magnitude and statistical significance of this coefficient suggest that legal and regulatory alignment remains an important component of AML system performance.

RBA implementation (R.1) also shows a positive and statistically significant relationship with AML effectiveness ($\beta = 0.221$, $p = 0.017$). This finding suggests that jurisdictions that incorporate risk-sensitive and adaptive AML strategies tend to perform better in operational terms. However, the smaller coefficient relative to TC indicates that the contribution of R.1, while meaningful, is more moderate in comparison.

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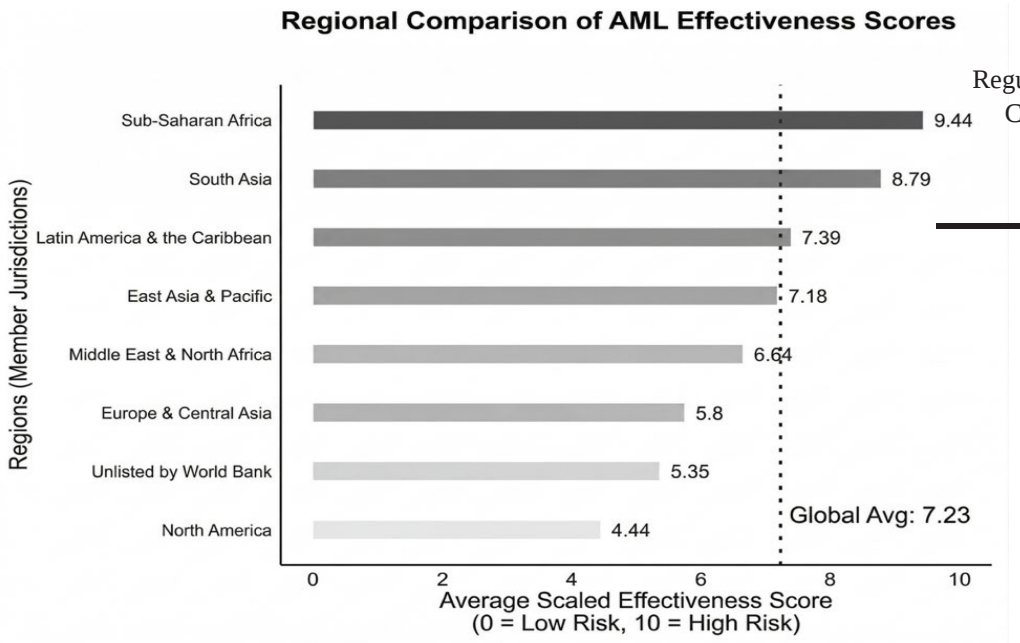

Figure 4. Regional distribution of AML effectiveness score
Source: Authors' own work

Table 6. OLS Regression results predicting AML effectiveness (HC3 robust standard errors, $n = 102$)

Variable	Coefficient (β)	Std. Error	t-value	p-value	95% CI
Constant	4.724	1.066	4.429	<0.001	[2.606, 6.841]
Technical compliance (TC)	0.367	0.110	3.334	0.001	[0.152, 0.583]
Risk-based approach (R.1)	0.221	0.093	2.395	0.017	[0.040, 0.402]
Coordination mechanisms (R.2)	−0.134	0.091	−1.477	0.140	[−0.312, 0.044]
GDP per capita PPP (GDP_z)	−0.433	0.216	−2.005	0.045	[−0.857, −0.010]
Rule of law (RoL_z)	−0.028	0.288	−0.096	0.924	[−0.592, 0.536]
CPI score (CPI_z)	0.083	0.198	0.417	0.677	[−0.306, 0.471]
Financial depth (FinDepth_z)	−0.189	0.056	−3.348	0.001	[−0.300, −0.078]

Note(s): Model Statistics: $R^2 = 0.562$ | Adjusted $R^2 = 0.530$ | $F = 15.622$ | $p < 0.001$ | $n = 102$
Source(s): Authors' own work

In contrast, Coordination Mechanisms (R.2) display a negative but statistically insignificant association with AML effectiveness in the full model ($\beta = -0.134$, $p = 0.140$). This suggests that the formal existence of coordination structures does not automatically translate into improved AML outcomes once other institutional and structural factors are taken into account. A more plausible interpretation is that coordination quality, mandate clarity and actual inter-agency integration matter more than formal institutional presence alone.

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Among the structural controls, GDP per capita PPP ($\beta = -0.433$, $p = 0.045$) and Financial Depth ($\beta = -0.189$, $p = 0.001$) show statistically significant negative associations with AML effectiveness. By contrast, Rule of Law and CPI are not statistically significant in the full specification.

The negative coefficient observed for Coordination Mechanisms (R.2) may reflect differences in how coordination structures operate in practice across jurisdictions. While formal coordination frameworks may exist, their effectiveness can vary depending on institutional capacity, clarity of roles and the extent of operational integration. In some cases, coordination mechanisms may be fragmented, bureaucratic or symbolic rather than functionally effective, which may limit their contribution to AML outcomes. This finding suggests that the existence of coordination structures alone is not sufficient to improve AML effectiveness. Instead, the quality of implementation and the degree of practical integration across agencies appear to be critical.

The significant negative coefficients for GDP per capita ($\beta = -0.433$, $p = 0.045$) and financial depth ($\beta = -0.189$, $p = 0.001$) are unexpected, as wealthier jurisdictions with more developed financial systems might normally be expected to achieve stronger AML outcomes. Several possible explanations may account for these findings.

First, the result may partly reflect the way the Basel AML Index measures ML risk. Jurisdictions with highly developed and internationally connected financial systems often face more complex risk environments because they process larger volumes of cross-border transactions and are more exposed to global financial flows. As a result, they may receive less favourable effectiveness scores even where their regulatory and supervisory systems are relatively strong. The lower average scores observed for North America and Europe and Central Asia are broadly consistent with this explanation.

Second, financial depth may reflect the size and complexity of the financial system rather than the quality of its governance. Jurisdictions with high levels of private-sector credit relative to GDP generally have larger and more complex financial sectors, creating more opportunities and channels through which ML may occur. Even well-resourced supervisory authorities may struggle to monitor the volume, variety and complexity of transactions within such systems.

Third, the composition of the complete-case sample may have influenced the estimated coefficients. The retained sample includes several sub-Saharan African jurisdictions characterised by relatively low GDP per capita, limited financial depth and high levels of AML risk. Their inclusion may affect the estimated relationships between structural economic conditions and AML effectiveness.

To assess whether these findings were specific to particular income levels or regions, the regression model was reestimated using two subsamples. Among higher-income jurisdictions, defined as those with GDP per capita at purchasing power parity above USD 30,000 ($n = 47$), the negative coefficient for GDP per capita became considerably smaller and was no longer statistically significant. This suggests that the relationship may be concentrated among lower-income jurisdictions rather than representing a general pattern across the full sample.

The analysis was also restricted to sub-Saharan African jurisdictions ($n = 18$). Within this subsample, the negative coefficient for financial depth remained, suggesting that greater banking penetration within the region has not yet been associated with stronger measurable AML outcomes. Overall, the subsample findings indicate that the negative structural relationships are not consistent across all jurisdictions. Future research could examine interaction effects between income levels and regional groups to provide a more detailed understanding of these patterns.

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To assess the robustness of the regression model, multicollinearity was examined using Variance VIF. The results are presented in Table 7.

As shown in Table 7, most VIF values fall within acceptable thresholds. However, Rule of Law (RoL_z) shows a VIF above 10, and CPI_z also records a comparatively high VIF, indicating multicollinearity concerns in the full model. This pattern is consistent with the strong correlation observed between Rule of Law and CPI in the correlation matrix.

Further diagnostic tests were conducted to examine the validity of the regression assumptions in the full model estimated on the complete-case sample ($N = 102$). The results are summarized in Table 8. The Jarque–Bera test indicates that the residuals are approximately normally distributed, while the Breusch–Pagan test confirms the presence of heteroskedasticity. This supports the use of HC3 robust standard errors in the reported regression model.

The diagnostic tests indicate that the residuals are approximately normally distributed. The Jarque–Bera statistic is 0.418 ($p = 0.811$), while the Breusch–Pagan statistic is 21.805 ($p = 0.003$), confirming heteroskedasticity and validating the use of HC3 robust standard errors.

A robustness specification excluding Rule of Law was estimated to address multicollinearity. The results remained substantively similar: TC ($\beta = 0.368$, $p = 0.001$), RBA ($\beta = 0.221$, $p = 0.014$), GDP per capita ($\beta = -0.439$, $p = 0.012$) and Financial Depth ($\beta = -0.191$, $p < 0.001$) remained statistically significant, while Coordination Mechanisms remained negative but statistically insignificant. The maximum VIF fell to 2.78 and adjusted R^2 improved slightly to 0.534, confirming the stability of the main findings.

Figures 5 and 6 present the residual diagnostics for the updated full regression model estimated on the complete-case sample of 102 jurisdictions.

Table 7. Multicollinearity diagnostics (VIF)-full model

Variable	VIF
Technical compliance (TC)	2.65
Risk-based approach (R.1)	1.79
Coordination mechanisms (R.2)	1.55
GDP per capita PPP (GDP_z)	3.40
Rule of law (RoL_z)	12.75
CPI score (CPI_z)	9.33
Financial depth (FinDepth_z)	1.54

Note(s): VIF values above 10 indicate a serious multicollinearity concern. Rule of Law (RoL_z) and CPI_z show substantial collinearity in the full model
Source(s): Authors' own work

Table 8. Regression diagnostic tests (complete-case regression sample, $n = 102$)

Test	Statistic	*p*-value	Interpretation
Jarque–Bera	0.418	0.811	Residuals approximately normal
Breusch–Pagan	21.805	0.003	Heteroskedasticity present – HC3 SEs applied
Skewness	−0.005	–	Near-perfect symmetry
Kurtosis	−0.314	–	Slightly platykurtic; acceptable

Source(s): Authors' own work

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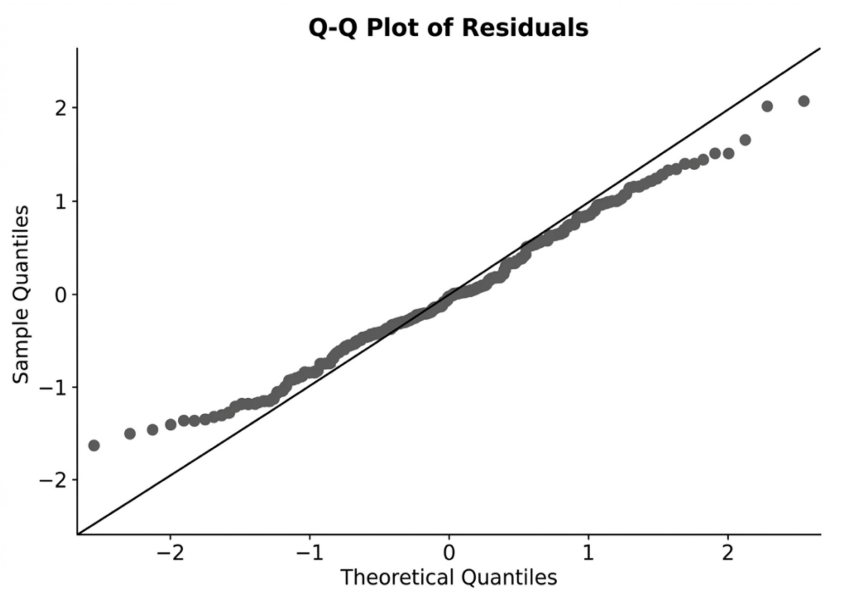

Figure 5. Q–Q Plot of residuals from full regression model ($n = 102$)
Source: Authors' own work

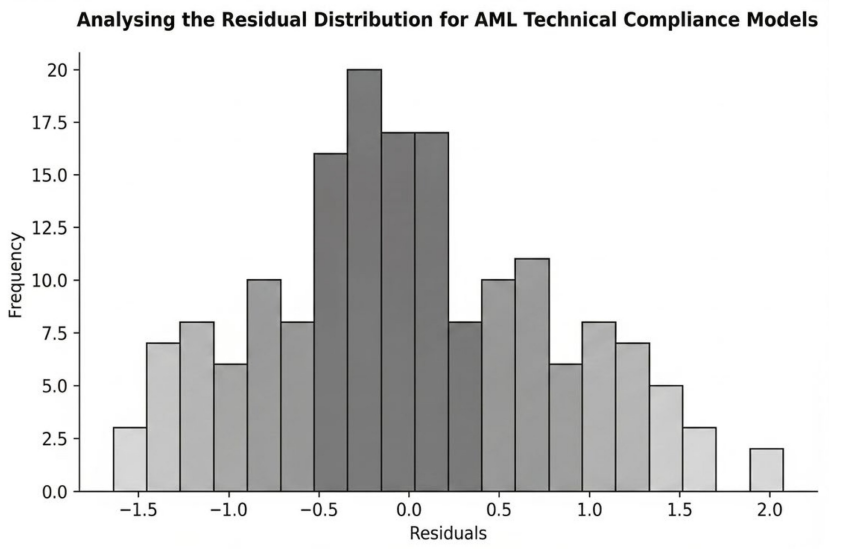

Figure 6. Distribution of residuals from full regression model ($n = 102$)
Source: Authors' own work

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Figures 5 and 6 provide a visual assessment of the regression residuals from the full model estimated on the complete-case sample. The Q–Q plot shows residuals closely following the diagonal reference line, indicating that the normality assumption is broadly satisfied. Minor deviations are limited to the tails, and the residual distribution is approximately symmetric and bell-shaped around zero, which is consistent with the Jarque–Bera result. Together, these results indicate that the residuals do not exhibit substantial violations of the normality assumption.

Overall, the regression findings provide important insights into the determinants of AML effectiveness across jurisdictions. While TC emerges as a positive and statistically significant predictor, the results indicate that compliance alone does not fully explain variations in AML outcomes. The positive contribution of the RBA highlights the importance of adaptive and context-specific implementation, while the negative but statistically insignificant coefficient for Coordination Mechanisms points to the complexity of institutional arrangements in practice.

These findings suggest that AML effectiveness is shaped not only by the existence of legal frameworks, but also by how these frameworks are operationalized within institutional settings. In particular, the results point to the importance of implementation quality, governance capacity and functional integration across agencies. This reinforces the broader argument that formal compliance with international standards, while necessary, is not sufficient to ensure effective AML performance.

The model explains 56.2% of the variation in AML effectiveness, indicating moderate explanatory power. At the same time, a substantial share of cross-jurisdictional variation remains unexplained by the current specification. This suggests that additional factors, such as enforcement capacity, political commitment, financial system maturity and informal institutional dynamics, may also play an important role.

Future research could extend the analysis by incorporating such variables, as well as by adopting longitudinal or panel data approaches to better capture dynamic relationships over time. Taken together, the regression results provide empirical support for the existence of a compliance–effectiveness gap in AML systems and highlight the need for a more nuanced understanding of how institutional mechanisms operate in practice, rather than relying solely on formal indicators of compliance.

4.6 Cluster visualization

To further interpret the relationship between TC and AML Effectiveness (EFF), a two-dimensional scatter plot was developed, mapping 172 jurisdictions based on their scaled scores (Figure 7). In this visualization, both axes are expressed in terms of residual risk, where 0 represents low risk (strong performance) and 10 represents high risk (weak performance). This scaling allows a consistent interpretation of AML vulnerability across jurisdictions.

Based on the distribution of observations, three broad clusters emerge – low-risk, medium-risk and high-risk jurisdictions – providing a structured view of AML system performance across countries. The visualization highlights that jurisdictions with similar levels of TC risk can still exhibit different levels of effectiveness risk, reinforcing the importance of implementation quality and institutional capacity.

Jurisdictions located toward the bottom-left of the figure display relatively low compliance risk and low effectiveness risk, indicating stronger AML system performance overall. By contrast, jurisdictions in the upper-right portion of the figure show elevated levels of both compliance risk and effectiveness risk, suggesting weaknesses in both legal alignment and operational outcomes.

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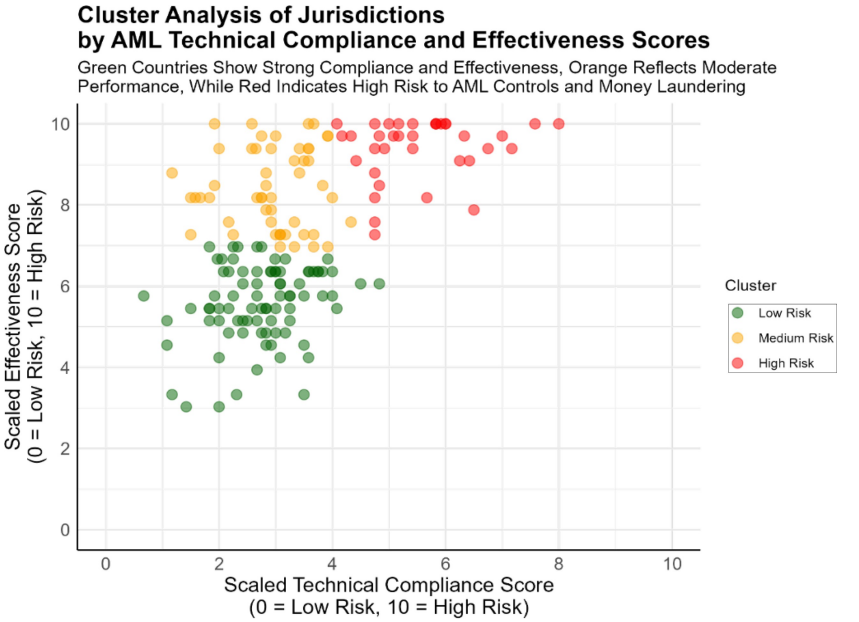

Figure 7. Scatter plot of compliance vs effectiveness with clusters
Source: Authors' own work

The distribution also shows that some jurisdictions with similar compliance profiles differ meaningfully in effectiveness outcomes. This pattern visually supports the study's broader finding that TC alone is not sufficient to explain AML effectiveness and that implementation quality, institutional capacity and broader structural conditions play an important role in shaping observed outcomes across jurisdictions.

Overall, the cluster distribution provides visual support for the compliance–effectiveness gap identified in the broader analysis and reinforces the need for more integrated and adaptive AML frameworks.

5. Discussion

5.1 Interpretation of key results

The findings of this study contribute empirical evidence to a long-standing debate in AML research: namely, that TC with the FATF Recommendations alone is insufficient to ensure effective AML outcomes. Although many jurisdictions demonstrate moderate or relatively high levels of formal compliance, the results show that compliance alone does not fully explain cross-jurisdictional variation in AML effectiveness. This supports the argument advanced in earlier studies that implementation quality, contextual relevance and institutional capacity are critical to achieving meaningful AML performance.

The correlation analysis indicates that TC is positively associated with AML Effectiveness, but the relationship remains only moderate in strength. This suggests that legal and regulatory adherence matters but does not by itself guarantee stronger operational

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outcomes. In practical terms, formal AML frameworks may exist without being consistently implemented, enforced or translated into effective institutional performance, reinforcing concerns about a compliance–effectiveness gap in AML governance.

The regression analysis provides further nuance. TC emerges as a positive and statistically significant predictor of AML effectiveness in the full model, confirming that legal and regulatory alignment remains an important structural foundation for AML systems. However, its effect size also indicates that compliance alone is not sufficient to account for the broader variation observed across jurisdictions.

The RBA (R.1) also shows a positive and statistically significant association with AML effectiveness in the full model. This finding supports the view that adaptive, context-sensitive AML strategies are more likely to improve operational performance than purely formal legal alignment. In this respect, the results are consistent with the FATF's broader shift toward risk-based supervision and outcome-oriented evaluation.

In contrast, Coordination Mechanisms (R.2) show a negative but statistically insignificant coefficient in the full model once structural controls are included. This suggests that the formal existence of coordination structures should not automatically be interpreted as evidence of stronger AML effectiveness. A more plausible interpretation is that coordination quality, mandate clarity and actual inter-agency integration matter more than institutional form alone.

Overall, the findings suggest that AML effectiveness is shaped by a combination of legal alignment, adaptive implementation and structural capacity. The results reinforce the need to move beyond a purely compliance-based perspective and to focus more closely on how AML frameworks operate in practice across different institutional settings.

5.2 Regional context

The analysis reveals clear regional differences in both compliance and effectiveness. In the current data set, sub-Saharan Africa and South Asia record the highest average AML effectiveness scores, while North America and Europe and Central Asia show comparatively lower regional averages. These patterns suggest that AML performance is not determined by formal compliance scores alone and may reflect broader differences in institutional structure, implementation context, regulatory priorities and data set composition across regions.

At the same time, regional variation in TC does not map neatly onto regional variation in AML effectiveness. This reinforces the broader finding that legal alignment and operational performance do not move together in a simple or uniform way across jurisdictions. The results therefore support a more context-sensitive interpretation of AML performance, in which compliance, implementation quality and structural capacity interact in complex ways.

These findings underline the need to adapt AML strategies to the institutional realities of different jurisdictions. In settings with weaker enforcement capacity or fragmented institutions, progress is more likely when policy efforts focus on implementation quality, prioritization of high-risk areas, institutional resilience and the practical functioning of coordination mechanisms rather than formal rule expansion alone.

From a policy perspective, the findings have practical implications for jurisdictions undergoing the FATF mutual evaluation follow-up process. Jurisdictions rated Partially Compliant or Non-Compliant with Recommendation 1 are often placed under enhanced follow-up by the relevant FATF-Style Regional Body. The results of this study indicate that stronger implementation of Recommendation 1 is associated with improved operational effectiveness, rather than merely better compliance ratings. This suggests that jurisdictions should prioritise keeping their National Risk Assessments up to date and ensuring that the findings are reflected in supervisory planning and guidance for reporting entities. Although

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national risk assessments are generally reviewed every four to five years, completing the assessment is not sufficient on its own. The more important issue is whether supervisory attention and resources are directed toward the sectors, products and activities identified as presenting the greatest risk.

The statistically insignificant coefficient for Recommendation 2 also has policy implications. The result suggests that simply establishing or redesignating a national AML coordination body may not, by itself, lead to stronger effectiveness outcomes. However, this should not be interpreted as evidence that national coordination is unimportant. Rather, it may indicate that the formal existence of a coordination structure does not necessarily reflect how effectively agencies work together in practice. This is consistent with the distinction made by the FATF between formal coordination arrangements and their operational effectiveness, which is assessed under Immediate Outcome 1. Jurisdictions seeking to improve their performance in this area may therefore benefit more from clear institutional mandates, structured information-sharing procedures and regular inter-agency engagement than from organizational restructuring alone.

More broadly, the findings are relevant to jurisdictions that demonstrate moderate levels of TC but weaker operational effectiveness, a pattern observed among several East Asian and Latin American jurisdictions in the data set. In such cases, future mutual evaluations may need to place greater emphasis on enforcement results, supervisory practice and the practical application of AML measures, rather than focusing mainly on the adequacy of the legal framework. This is consistent with the direction taken by the FATF since 2012, when effectiveness became a more prominent part of the mutual evaluation process. The cross-jurisdictional evidence presented in this study provides further empirical support for this approach.

6. Conclusion

This study set out to evaluate whether TC with the FATF Recommendations can be considered a reliable indicator of AML system effectiveness across jurisdictions. Drawing on a cross-jurisdictional data set covering 172 jurisdictions and multivariate analysis on a complete-case sample of 102 jurisdictions, the findings provide clear evidence that TC is important, but not sufficient on its own to explain effective AML performance.

Four conclusions emerge from the analysis. First, TC remains a significant positive predictor of AML effectiveness, confirming that legal and regulatory alignment provides an important structural foundation. Second, the RBA contributes positively and significantly to AML effectiveness, underscoring the value of adaptive and context-specific implementation. Third, formal coordination mechanisms should not be treated as effective by default, as their estimated effect becomes statistically insignificant in the full model once structural controls are included. Fourth, structural factors such as GDP per capita and financial depth materially shape AML outcomes and help explain why similarly compliant jurisdictions may perform differently in practice.

Taken together, these findings make a broader contribution to AML research by showing that the compliance–effectiveness gap is not merely a theoretical concern, but an empirically observable cross-jurisdictional pattern. The study therefore supports a more balanced understanding of AML governance – one that combines legal compliance with implementation quality, institutional capability and adaptive risk-based practice rather than relying on formal compliance indicators alone.

This study has several limitations. First, the analysis relies on cross-sectional secondary data, which allows relationships across jurisdictions to be identified but does not support causal conclusions. Future research could address this limitation by using panel or

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longitudinal data drawn from successive FATF mutual evaluation rounds. Such an approach would make it possible to examine whether changes in TC, risk-based implementation or national coordination are followed by improvements in AML effectiveness over time.

Second, the regression analysis is based on a complete-case sample of 102 jurisdictions rather than the full data set of 172 jurisdictions. The findings should therefore be interpreted as conditional associations within the merged sample for which all required variables were available. Although the retained and excluded jurisdictions were broadly similar across the main AML measures, some regions were underrepresented because of missing structural data. Future studies could use alternative data sources or missing-data methods to improve jurisdictional coverage and assess whether the results remain consistent across a broader sample.

A further limitation concerns the measurement of AML effectiveness. The dependent variable is bounded between 0 and 10 and is based on externally developed indicators rather than direct enforcement outcomes. Although linear regression was used in this study, future research could apply fractional response or Tobit-type models as robustness checks. More direct measures, such as the value of assets recovered, the number of successful prosecutions and the proportion of suspicious transaction reports that lead to meaningful investigations, would also provide a clearer assessment of what AML systems achieve in practice. These measures would help distinguish formal compliance and institutional outputs from actual reductions in ML risk.

The subsample findings also suggest that the relationships between structural factors and AML effectiveness may vary across regions and income groups. Future models could therefore include interaction terms between RBA implementation, income level and regional classification. This would help identify the conditions under which TC and risk-based implementation are most strongly associated with effectiveness and where these relationships appear to weaken.

Finally, future research could include measures of technological and analytical capacity within AML enforcement systems. Relevant indicators may include the analytical capabilities of Financial Intelligence Units and the use of regulatory technology in financial supervision. These variables could help distinguish the practical quality of implementation from the formal strength of the legal framework, an area that broad composite indicators such as the Basel AML Index may not fully capture.

Taken together, these extensions could move AML research beyond cross-sectional comparisons of formal compliance and toward a more dynamic and mechanism-based understanding of what makes AML systems effective in practice.

Even with these limitations, the study offers meaningful empirical insight for both research and policy. It suggests that efforts to improve AML effectiveness should focus not only on legal compliance, but also on how AML systems are implemented, coordinated and supported by broader institutional and economic capacity. In that sense, the study's central implication is straightforward: stronger AML systems are built not only through better rules, but through better implementation of those rules in practice.

Funding
No external funding was received for the completion of this study.

Ethics statement
This study is based entirely on secondary data that is publicly accessible through academic licensing. Therefore, ethical approval was not required.

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Data availability

The data set used in this research was obtained from the Basel Institute on Governance (2024) under an academic license. Due to licensing restrictions, the data cannot be shared publicly.

References

Ai, L. (2012), "Rule-based but risk-oriented" approach for combating money laundering in Chinese financial sectors", *Journal of Money Laundering Control*, Vol. 15 No. 2, pp. 198-209, doi: 10.1108/13685201211218225.

Ai, L., Broome, J. and Yan, H. (2010), "Carrying out a risk based approach to AML in China: partial or full implementation?", *Journal of Money Laundering Control*, Vol. 13 No. 4, pp. 394-404, doi: 10.1108/13685201011083894.

Alsuwailem, A.A.S. and Saudagar, A.K.J. (2020), "Anti-money laundering systems: a systematic literature review", *Journal of Money Laundering Control*, Vol. 23 No. 4, pp. 833-848, doi: 10.1108/JMLC-02-2020-0018.

Arner, D.W., Barberis, J.N. and Buckley, R.P. (2015), "The evolution of fintech: a new post-crisis paradigm?", University of Hong Kong Faculty of Law Research Paper No. 2015/047, UNSW Law Research Paper No. 2016-62, doi: 10.2139/ssrn.2676553.

Castelao-López, J., Corzo Santamaría, T. and Lagoa-Varela, D. (2025), "Analysis of the main techniques and tools to combat money laundering: a review of the literature", *Journal of Money Laundering Control*, Vol. 28 Nos 4-5, doi: 10.1108/JMLC-10-2024-0159.

Channa, K.A., Khoso, D.H. and Malik, A.H. (2025), "Anti-money laundering regulations in Pakistan: a comparative analysis with global best practices", *Journal of Money Laundering Control*, Vol. 28 No. 3, pp. 518-532, doi: 10.1108/JMLC-03-2025-0038.

De Wit, J. (2007), "A risk based approach to AML: a controversy between financial institutions and regulators", *Journal of Financial Regulation and Compliance*, Vol. 15 No. 2, pp. 156-165, doi: 10.1108/13581980710744048.

Dote-Pardo, J.S. and Severino-González, P. (2025), "Money laundering in emerging countries: patterns, trends, and knowledge gaps from a systematic review", *Journal of Money Laundering Control*, Vol. 28 No. 2, pp. 341-358, doi: 10.1108/JMLC-01-2025-0002.

Fathi, M., Al-Shammar, M. B S. and Mohamed, G.S.K. (2025), "Cryptocurrency and criminal liability: investigating legal challenges in addressing financial crimes in decentralized systems", *Journal of Money Laundering Control*, Vol. 28 No. 3, pp. 504-517, doi: 10.1108/JMLC-07-2024-0110.

Ferwerda, J. (2009), "The economics of crime and money laundering: does anti-money laundering policy reduce crime?", *Review of Law and Economics*, Vol. 5 No. 2, pp. 903-929, doi: 10.2202/1555-5879.1421.

Gikonyo, C. (2019), "Legal profession and AML in Kenya: exploring institutional alignment", *Journal of Money Laundering Control*, Vol. 22 No. 2, pp. 247-256, doi: 10.1108/jmlc-01-2018-0010.

Halford, E., Gibson, I., Newfield, M. and Dhanwala, M. (2025), "Developing a scoring model for managing money laundering transactions using machine learning", *Journal of Money Laundering Control*, Vol. 28 No. 7, pp. 30-49, doi: 10.1108/JMLC-09-2024-0152.

Honga, I.S., Gikonyo, C. and Asaala, E. (2025), "From overlap to distinction: disentangling the concepts of terrorism financing and money laundering", *Journal of Money Laundering Control*, Vol. 28 No. 1, pp. 171-183, doi: 10.1108/JMLC-06-2024-0102.

Kamaruddin, N., Tahir, N.S., Othman, S. and Kamaruddin, S. (2025), "Compliance of corporate gatekeepers under AML regime in Malaysia: issues and challenges", *Journal of Money Laundering Control*, Vol. 28 Nos 4-5, doi: 10.1108/JMLC-09-2024-0147.

Downloaded from ftp.nowpublishers.com/jfrc/article-pdf/doi/10.1108/JFRC-08-2025-0248/11830875/jfrc-08-2025-0248en.pdf by guest on 10 September 2026

Korpela, S.J. (2025), "Between a rock and a hard place: managing the conflict between anti-money laundering and financial inclusion", *Journal of Money Laundering Control*, Vol. 28 No. 7, doi: 10.1108/JMLC-04-2025-0049.

Kurum, E. (2023), "RegTech solutions and AML compliance: what future for financial crime?", *Journal of Financial Crime*, Vol. 30 No. 3, pp. 776-794, doi: 10.1108/JFC-04-2020-0051.

Levi, M. and Reuter, P. (2006), "Money laundering", *Crime and Justice*, Vol. 34 No. 1, pp. 289-375, doi: 10.1086/501508.

Mallika, B.K. and Ramasubramanian, V.H. (2025), "Anti-money laundering system in detecting and preventing money laundering activities: a systematic review", *Journal of Money Laundering Control*, Vol. 28 No. 2, pp. 385-407, doi: 10.1108/JMLC-07-2024-0108.

Mekpor, E.S., Aboagye, A. and Welbeck, J. (2018), "Determinants of AML compliance among FATF member states", *Journal of Financial Regulation and Compliance*, Vol. 26 No. 3, pp. 442-459, doi: 10.1108/JFRC-11-2017-0103.

Mokone, P.P. (2025), "An analysis of the challenges in combatting money laundering within bureaux de change establishments in Botswana", *Journal of Money Laundering Control*, Vol. 28 No. 7, pp. 1-15, doi: 10.1108/JMLC-06-2024-0100.

Moncalvo, D., Oliva, M. and Díaz Castellano, A. (2025), "Innovation practices and priorities in AML/CFT financial intelligence", *Journal of Money Laundering Control*, Vol. 28 Nos 4-5, doi: 10.1108/JMLC-05-2025-0063.

Naheem, M.A. (2020), "The agency dilemma in anti-money laundering regulation", *Journal of Money Laundering Control*, Vol. 23 No. 1, pp. 26-37, doi: 10.1108/jmlc-01-2016-0007.

Pavlidis, G. (2025), "Transforming asset recovery offices (AROs) to enhance their role in combating money laundering", *Journal of Money Laundering Control*, Vol. 28 No. 2, pp. 327-340, doi: 10.1108/JMLC-09-2024-0154.

Pol, R.F. (2020), "Anti-money laundering: the world's least effective policy experiment? Together, we can fix it", *Policy Design and Practice*, Vol. 3 No. 1, pp. 73-94, doi: 10.1080/25741292.2020.1725366.

Ramadhan, S. (2025), "Harnessing machine learning for money laundering detection: a criminological theory-centric approach", *Journal of Money Laundering Control*, Vol. 28 No. 1, pp. 184-201, doi: 10.1108/JMLC-04-2024-0083.

Şeker, E.Ö. (2025), "The EU AML package and its impact on Türkiye", *Journal of Money Laundering Control*, Vol. 28 No. 3, pp. 561-571, doi: 10.1108/JMLC-08-2024-0129.

Sultan, N., Passas, N., Mohamed, N., Hussain, D. and Sulaiman, S. (2025a), "The nexus of environmental crimes and money laundering/terrorist financing: effectiveness of the FATF recommendations against green criminology in developing jurisdictions", *Journal of Money Laundering Control*, Vol. 28 No. 3, pp. 485-503, doi: 10.1108/JMLC-08-2024-0142.

Sultan, N., Mohamed, N., Chisunga, D. and Satar, A. (2025b), "The correlation of financial action task force recommendations: the perception of compliance officers concerning the deployment of third parties and FinTech for customer due diligence", *Journal of Money Laundering Control*, Vol. 28 No. 2, pp. 292-314, doi: 10.1108/JMLC-08-2024-0135.

Zhang, G., Gao, Z., Dong, J. and Mei, D. (2023), "Machine learning approaches for constructing the national anti-money laundering index", *Finance Research Letters*, Vol. 52, p. 103568, doi: 10.1016/j.frl.2022.103568.

Downloaded from ftp.nowpublishers.com/jfrc/article-pdf/doi/10.1108/JFRC-08-2025-0248/11830875/jfrc-08-2025-0248en.pdf by guest on 10 September 2026

Appendix

Table A1. Variable and sub-pillar mapping table

Construct	Source component	Original scale	Transformed scale	Alignment rationale
AML effectiveness (EFF)	Basel AML index overall score	0–10 (higher = higher risk)	Reversed: higher = stronger effectiveness	Composite measure of operational AML performance drawing on FATF immediate outcomes
Technical compliance (TC)	FATF MER ratings across 40 Recommendations (converted to numeric composite)	0–10	Retained; z-standardised for regression	Measures formal legal and regulatory alignment with FATF standards
RBA Implementation (R.1)	FATF MER Recommendation 1 rating	0–3 (NC to C)	Retained; z-standardised for regression	Assesses whether jurisdictions identify ML/TF risks and apply proportionate controls
Coordination (R.2)	FATF MER Recommendation 2 rating	0–3 (NC to C)	Retained; z-standardised for regression	Assesses whether national AML/CFT policies are informed by risk assessments and coordinated across agencies
GDP per capita PPP	World Bank WDI, GDP per capita PPP, 2023	USD	z-score	Controls for economic development as a structural predictor of AML capacity
Rule of law	World Bank WGI, Rule of Law estimate, 2023	−2.5 to + 2.5	z-score	Controls for institutional governance quality
CPI score	Transparency International, CPI, 2024	0–100	z-score	Controls for corruption levels that interact with AML enforcement
Financial depth	World Bank WDI, Domestic credit to private sector (% of GDP), 2022	% of GDP	z-score	Controls for financial sector complexity and banking penetration

Note(s): FATF MER Recommendation ratings are coded as: 0 = non-compliant (NC); 1 = partially compliant (PC); 2 = largely compliant (LC); 3 = compliant (C). Basel AML Index scores are from the 2024 edition published by the Basel Institute on Governance, used under academic license. World Bank indicator codes for reference: GDP per capita PPP = NY.GDP.PCAP.PP.CD; Rule of Law = RL.EST; Financial Depth = FS.AST.PRVT.GD.ZS
Source(s): Authors' own work

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