"Evaluating crypto regulation stringency and its impact on digital asset market adoption"

AUTHORS	Maksym Ivasenko Serhiy Frolov Viktoriia Datsenko Tetiana Tereshchenko Natalia Pavlova

ARTICLE INFO	Maksym Ivasenko, Serhiy Frolov, Viktoriia Datsenko, Tetiana Tereshchenko and Natalia Pavlova (2026). Evaluating crypto regulation stringency and its impact on digital asset market adoption. *Banks and Bank Systems*, *21*(2), 133-149. doi:10.21511/bbs.21(2).2026.10
DOI	http://dx.doi.org/10.21511/bbs.21(2).2026.10
RELEASED ON	Thursday, 11 June 2026
RECEIVED ON	Tuesday, 21 April 2026
ACCEPTED ON	Wednesday, 03 June 2026

JOURNAL	"Banks and Bank Systems"
ISSN PRINT	1816-7403
ISSN ONLINE	1991-7074
PUBLISHER	LLC "Consulting Publishing Company "Business Perspectives"
FOUNDER	LLC "Consulting Publishing Company "Business Perspectives"

NUMBER OF REFERENCES	NUMBER OF FIGURES	NUMBER OF TABLES
59	**4**	**7**

BUSINESS PERSPECTIVES

LLC "CPC "Business Perspectives"
Hryhorii Skovoroda lane, 10,
Sumy, 40022, Ukraine
www.businessperspectives.org

Maksym Ivasenko (Ukraine), **Serhiy Frolov** (Ukraine), **Viktoriia Datsenko** (Ukraine), **Tetiana Tereshchenko** (Ukraine), **Natalia Pavlova** (Ukraine)

EVALUATING CRYPTO REGULATION STRINGENCY AND ITS IMPACT ON DIGITAL ASSET MARKET ADOPTION

Type of the article: Research Article

Received on: 21st of April, 2026
Accepted on: 3rd of June, 2026
Published on: 11th of June, 2026

Maksym Ivasenko, Ph.D., Assistant, Department of Finance, Banking and Insurance, Sumy National Agrarian University, Ukraine. (Corresponding author)

Serhiy Frolov, Doctor of Economics, Professor, Head of the Department of Finance of Business Entities and Insurance, Sumy National Agrarian University, Ukraine.

Viktoriia Datsenko, Ph.D. in Economics, Senior Lecturer of the Department of Marketing, Dean of the Faculty of Economics, Business and International Relations, University of Customs and Finance, Ukraine.

Tetiana Tereshchenko, Ph.D. in Economics, Associate Professor of the Department of Finance, Banking and Insurance, University of Customs and Finance, Ukraine.

Natalia Pavlova, Ph.D. in Law, Associate Professor of the Department of Law Enforcement Activity, University of Customs and Finance, Ukraine.

Conflict of interest statement:
Author(s) reported no conflict of interest

Abstract

The article provides a comprehensive empirical assessment of the legal and operational regimes of digital asset circulation and their real impact on the financial market. To quantitatively measure the degree of state control, a composite Crypto Regulation Stringency Index (CRSI) was applied, constructed based on the OECD-JRC methodology. The index integrates 16 parameters across five fundamental areas (legal status, anti-money laundering, taxation, licensing, and consumer protection) for 61 countries (jurisdictions) as of 2025. The developed tool demonstrated high internal consistency and factor structure reliability (Cronbach's $\alpha = 0.955$).

To determine the market consequences of legal regulation, the index values were compared with the Chainalysis 2025 Global Crypto Adoption Index. The direct unconditional correlation between the stringency of rules and the scale of digital asset usage proved to be weak. However, a multivariate regression analysis conditional on a set of macroeconomic and institutional covariates (income level, digital infrastructure development, financial freedom, quality of the rule of law, and the specifics of the MiCA regulation) revealed a robust and statistically significant positive relationship. The reversal of the effect is consistent with a Simpson-type compositional effect: within groups of countries with comparable levels of economic development, clear and strict regulatory rules stimulate market activity. The findings extend the literature on comparative financial law and demonstrate that state control does not suppress the crypto-economy but rather serves as its stable institutional foundation.

Keywords cryptocurrency regulation, digital assets, MiCA, FATF Travel Rule, financial monitoring, Chainalysis index, Simpson's paradox

JEL Classification G18, G28, K42, O38

INTRODUCTION

The rapid evolution of cryptocurrencies into a global asset class has significantly transformed the global financial system, as evidenced by the soaring growth of their market capitalization and trading volumes, particularly in emerging market economies. Despite the deep integration of digital assets into economic processes, the contemporary regulatory landscape remains highly fragmented, ranging from the establishment of comprehensive legal frameworks, such as the European MiCA regulation or dedicated licensing regimes in the UAE and Singapore, to outright bans on crypto transactions. This heterogeneity not only creates substantial risks to stability and investor protection but also poses a serious academic challenge. Furthermore, the circulation of digital assets is characterized by heightened risks of financial fraud, driven by the complexity of the digital infrastructure and the lack of on-chain data transparency. The problem is the current lack of a universal, continuous quantitative metric to evaluate the stringency of legal regimes, which precludes comparative empirical research and hinders a comprehensive understanding of the actual impact of state control on the crypto-economy.

The relevance of this study is driven by the need to resolve critical scholarly questions regarding the nature of the conditional nexus between state regulation and market activity. On the one hand, theories of regulatory arbitrage suggest that strict rules displace financial activity into more lenient jurisdictions. On the other hand, the concept of the legal foundations of financial markets proves that a clear legal framework, anti-money laundering (AML) standards, and consumer protection are mandatory prerequisites for the large-scale attraction of participants and capital. Determining which of these concepts dominates in practice is of critical importance for public policy development, as governments frequently face a dilemma: whether implementing stringent compliance procedures will trigger an immediate outflow of crypto activity from the national jurisdiction.

The necessity for a comprehensive assessment of regulatory regimes and their market implications across different nations has driven the architecture of this study. To bridge the existing measurement gap, a quantitative analysis tool – the Crypto Regulation Stringency Index (hereinafter referred to as CRSI) – was proposed within the study's methodology, constructed on the basis of primary legal and regulatory acts across 61 jurisdictions following the OECD–JRC guidelines. The application of this index enabled the transformation of qualitative de jure legal norms into standardized numerical datasets across five key dimensions. Subsequent econometric confrontation of the obtained values with actual indicators of global on-chain adoption allowed for isolating the net effect of regulatory pressure, while controlling for the macroeconomic and institutional development of the countries, thereby providing a well-founded answer to the question regarding the real nature of the interaction between state control and digital markets.

1. LITERATURE REVIEW

The economic rationale for regulating cryptocurrencies is driven by the necessity to overcome classical market failures. These include information asymmetry between issuers and investors; network externalities that foster market monopolization by leading exchanges; and cross-border spillovers of macroeconomic risks (Brunnermeier et al., 2019; Auer & Claessens, 2018). The presence of these market failures requires the application of specific regulatory instruments, particularly disclosure requirements for issuers, prudential supervision of crypto-exchanges, and stringent anti-money laundering and countering the financing of terrorism (AML/CFT) standards (Houben & Snyers, 2018; FATF, 2021).

Conversely, the institutional theory of finance (La Porta et al., 1997, 1998; Levine, 1999) offers a somewhat different perspective: transparent and predictable rules of the game inherently stimulate market activity by minimizing fraud risks and the probability of bankruptcies. Applying this logic to digital assets, Allen et al. (2022) theoretically demonstrate that legal certainty reduces the cost of capital for issuers and, consequently, ensures an increase in trading volumes within the regulated segment.

One of the first systematic studies of the regulatory framework across 76 jurisdictions was conducted by Cumming et al. (2019). They found that in the early stages, the emergence of rules for ICOs was predominantly a response to fraud incidents rather than an instrument of monetary policy. Subsequent works focused on the implementation of FATF requirements (specifically, the Travel Rule) for virtual asset service providers (Cumming et al., 2023; Halaburda et al., 2022), as well as on how specific regulatory decisions affect prices and trading volumes (Borri & Shakhnov, 2020; Auer et al., 2022a; Bianchi & Babiak, 2022). The adoption of the European MiCA regulation provided impetus for the emergence of highly specialized studies dedicated to the harmonization of legal regimes (Zetzsche et al., 2021; Ferreira & Sandner, 2021; Maume, 2023). However, this literature is

http://dx.doi.org/10.21511/bbs.21(2).2026.10

mostly limited to conceptual analysis or relies on the event study methodology. To date, researchers have not proposed a single, relevant, and continuous indicator that would allow for a quantitative assessment of the degree of regulatory stringency.

Previous empirical studies demonstrate a consensus regarding a robust set of factors that correlate with the level of cryptocurrency adoption. These include per capita income, access to banking services, Internet penetration rates, and the instability of national fiat currencies (Auer & Claessens, 2018; Feyen et al., 2022; Hairudin et al., 2020; Saiedi et al., 2021; Bhimani et al., 2022; Ivasenko et al., 2025). Distinct strands of research focus on the use of cryptocurrencies as a channel for cross-border remittances (Adrian & Mancini-Griffoli, 2021) and on speculative demand (Liu et al., 2022; Liu & Tsyvinski, 2021). The existing evidence base confirms the necessity of mandatory inclusion of income, financial inclusion, and digital infrastructure indicators as control variables in any model assessing the relationship between the CRSI and crypto activity.

The methodological framework for indicator construction is synthesized in the OECD-JRC handbook (Nardo et al., 2008) and a series of JRC working papers (Saisana & Tarantola, 2002; Saisana et al., 2005). The most relevant counterparts in the field of finance are the Doing Business ranking (Djankov et al., 2002, 2003), the IMF Financial Development Index (Svirydzenka, 2016), as well as approaches based on computer-assisted textual analysis (Hassan et al., 2019; Manela & Moreira, 2017). The CRSI has been developed in accordance with the OECD–JRC methodological standards, which guarantees transparency of coding, objectivity of weighting, and robustness to alternative aggregation methods.

The analysis conducted reveals several gaps in the existing literature. First, at the time of writing, there is an absence of a continuous quantitative metric of regulatory stringency for the post-MiCA period that is based on primary legal sources. Second, there are no quantitative studies confronting a multivariate regulatory index with the official 2025 Chainalysis ranking while appropriately addressing the problem of multicollinearity and applying robust standard errors. Third, previous works have not paid attention to the effect of Simpson's paradox when analyzing unconditional correlations. This study bridges these gaps: it outlines the algorithm for constructing the CRSI, conducts its external validation using the 2025 Chainalysis data, and presents the results of a multivariate analysis of the conditional relationship between regulation and market adoption.

2. METHODOLOGY

The 2025 CRSI sample covers 61 countries (jurisdictions), selected simultaneously based on three criteria:

(i) presence in the 2025 Chainalysis Top 100 or the 2024 Triple-A ranking;

(ii) the availability of at least one mandatory cryptocurrency-specific regulatory instrument; and

(iii) the availability of data regarding control variables from the World Bank and the ITU (International Telecommunication Union) (ITU, 2024).

The sample covers the entire European Economic Area, leading G20 member countries, jurisdictions with formal VASP regimes (Singapore, Hong Kong SAR, UAE), and top users of crypto-assets for cross-border remittances (El Salvador, Nigeria, Vietnam, Philippines). The sample accounts for approximately 95% of the cumulative transaction volume on monitored centralized exchanges in 2024–2025 (Chainalysis, 2025).

The CRSI architecture is decomposed into five key dimensions, identified based on the analysis of specialized literature (Houben & Snyers, 2018; Zetzsche et al., 2021; FATF, 2021). Each dimension aggregates from 3 to 4 sub-indicators (16 metrics in total). The detailed structure of the index is presented in Table 1. The full structure of the index is provided in Appendix B (Table B1).

Each sub-indicator is coded on a 0-1 scale with a step of 0.25, where 0 represents the total absence of a rule, 0.25 indicates voluntary recommendations, 0.5 denotes a mandatory rule with partial

Table 1. Structure of the CRSI index by key dimensions

Dimension		Sub-indicators	Quantity
P1.	Legal Status	Recognition as a regulated asset class; delineation between security and payment tokens; special law on digital assets	3
P2.	AML / CFT	Registration / licensing of VASPs; FATF Travel Rule; client due diligence (CDD) and beneficial ownership rules	3
P3.	Taxation	Income / capital gains tax; VAT; crypto transaction reporting	3
P4.	Licensing and Supervision	Authorization of exchanges; custody rules; prudential and conduct requirements	3
P5.	Consumer Protection	Disclosure / whitepaper; marketing; suitability rules; restriction on retail promotion	4

coverage, 0.75 signifies broad coverage with limited enforcement, and 1,0 represents a comprehensive rule with active supervision. Coding relied exclusively on primary legal sources, including: national statutes and codes (e.g., the U.S. Bank Secrecy Act and state-level Money Transmitter laws, Japan's Payment Services Act and FIEA, South Korea's Specific Financial Information Act, the UAE VARA Rulebook, Singapore's Payment Services Act 2019, India's PMLA notifications); EU-level instruments (Regulation (EU) 2023/1114 – MiCA (European Union, 2023), Directive (EU) 2015/849 – AMLD5, and Regulation (EU) 2023/1113 – Transfer of Funds Regulation); secondary legislation and supervisory acts issued by national regulators; official tax-authority guidance (IRS Notice 2014–21 and Revenue Ruling 2019–24, HMRC Cryptoassets Manual, ATO Tax Determinations); and international standards setters (FATF Recommendation 15 and the 2021 Updated Guidance on VASPs, IOSCO Policy Recommendations 2023, FSB Global Regulatory Framework 2023). Coding is performed using primary sources with a link to a specific regulatory instrument. For EU member states, the implementation of MiCA (since December 30, 2024) triggers an increase in the scores for P1V3, P4V1-P4V3, and P5V1-P5V2 (see Appendix B); national rules that remain outside the scope of MiCA are captured in P5V4 (the AMF whitelist in France, CONSOB powers in Italy, and CNMV Circular 1/2022 in Spain). For the United States, the absence of a comprehensive federal law is reflected in P1V3 = 0.5 and P4V1 = 0.5.

The value of each of the five dimensions is calculated as the simple arithmetic mean of its sub-indicators within the range [0, 1]. The composite CRSI index is an equally weighted average of the five dimensions. This approach is justified due to the high correlation among the components: minor changes in the weighting coefficients do not affect the final ranking of countries (Saisana & Tarantola, 2002). To test for robustness, alternative aggregation methods were applied:

(i) an index weighted using the principal component analysis (PCA) method;

(ii) the geometric mean, which more strictly penalizes imbalances among the indicators (Casadio Tarabusi & Guarini, 2013; Mazziotta & Pareto, 2016).

Formally, for country i and dimension k (k = 1, ..., 5), the calculation is expressed as follows:

$$P_k(i) = \frac{1}{|J_k|}\sum_{j \in J_k} V_{ij}, \tag{1}$$

$$CRSI_{EW}(i) = \frac{1}{5}\sum_{k=1}^{5} P_k(i), \tag{2}$$

$$CRSI_{PCA}(i) = \sum_{k=1}^{5} \omega_k P_k(i), \quad \omega_k \propto |\lambda_{k,1}|, \tag{3}$$

$$CRSI_{GM}(i) = \left(\prod_{k=1}^{5} Pk(i)\right)^{\frac{1}{5}} \tag{4}$$

The internal consistency of the index is evaluated using Cronbach's alpha coefficient (Cronbach, 1951), where a value above 0.7 is considered acceptable and above 0.9 is excellent (Nunnally & Bernstein, 1994). The factor structure (dimensionality) of the dataset is examined using principal component analysis (PCA). This is preceded by a sampling adequacy check using the Kaiser-Meyer-Olkin (KMO) criterion and Bartlett's test of sphericity (Kaiser, 1974) with target thresholds KMO ≥ 0.6 and a statistically significant Bartlett's test result.

http://dx.doi.org/10.21511/bbs.21(2).2026.10

To verify external validity, the CRSI is confronted with the 2025 Chainalysis Global Crypto Adoption Index. The report ranks 151 countries based on a composite score that includes:

(i) total transaction volume on centralized exchanges;

(ii) retail volume on centralized exchanges;

(iii) peer-to-peer (P2P) trading volume; and

(iv) (iv) transaction volume in DeFi protocols.

All metrics are adjusted for purchasing power parity (PPP), per capita GDP, and Internet penetration rates (Chainalysis, 2025).

All selected jurisdictions are represented in the 2025 Chainalysis report (the ranks were obtained from the official report, pp. 65-71). To convert the ordinal rank into a continuous metric of adoption, the inverse rank formula was applied:

$$ADP_i = \frac{152 - r_i}{151}. \quad (5)$$

To enable OLS regression, the ordinal 2025 Chainalysis country ranks were converted into a continuous adoption metric ranging from 0 (lowest) to 1 (highest) using the formula:

$$ADP_i = 1 - \frac{Rank_i - 1}{N - 1}. \quad (6)$$

Although this transformation treats all rank intervals equally, robustness checks – including ordered-logit models and Spearman's correlation – confirm that this is a conservative choice that preserves the original ordering and does not bias our statistical findings.

An OLS regression was estimated of the following form (empirical model):

$$\begin{aligned} ADP_i = \beta_0 + \beta_1 \cdot CRSI_i + \beta_2 \ln\left(GDP_{pci}\right) \\ +\beta_3 Internet\_resid_i \\ +\beta_4 FinFreedom\_resid_i \\ +\beta_5 RuleOfLaw\_resid_i + \varepsilon_i, \end{aligned} \quad (7)$$

where ADP_i – the inverse Chainalysis 2025 rank for country *i*; $CRSI_i$ – the equally weighted score of regulatory stringency; $\ln(GDP_{pci})$ – the natural logarithm of per capita GDP at PPP (World Bank, 2024); $Internet\_resid_i$, $FinFreedom\_resid_i$, $RuleOfLaw\text{-}resid_i$ – orthogonalized control variables (Internet penetration rate, financial freedom, and rule of law, respectively).

Standard errors are estimated using the heteroscedasticity-consistent HC3 method (Davidson & MacKinnon, 1993), which is optimal for finite samples with a moderately leveraged matrix of regressors (Long & Ervin, 2000). Statistical inference is supplemented by constructing bootstrap confidence intervals (1,000 replications, percentile method; Efron & Tibshirani, 1993) and jackknife analysis. Multicollinearity diagnostics are carried out through VIF calculation with an acceptable threshold of 10 (O'Brien, 2007). Specification adequacy is verified by Jarque-Bera tests for normality of residuals (Jarque & Bera, 1980), Breusch-Pagan (Breusch & Pagan, 1979) and White tests for heteroscedasticity, and Ramsey's RESET test for omitted nonlinearities (Ramsey, 1969). For additional robustness checks, a ridge regression with 5-fold cross-validation is applied (Hoerl & Kennard, 1970).

In cross-country samples, macroeconomic indicators (income, digital infrastructure, and institutional quality) are usually highly correlated with one another, leading to variance inflation of the estimates (VIF > 100). To avoid this without losing control factors, orthogonalization of additional covariates relative to the baseline indicator of economic development – $\ln(GDP_{pci})$ was applied. For each additional variable $X_i \in \{Internet, FinFreedom, RuleOfLaw\}$, an auxiliary regression is constructed:

$$X_i = y_0 + y_1 \cdot \ln\left(GDP_{pci}\right) + u_i. \quad (8)$$

The obtained residuals u_i (e.g., $Internet\_resid_i$) are used as independent regressors in the main model. According to the Frisch-Waugh-Lovell theorem (Frisch & Waugh, 1933; Lovell, 1963), this procedure eliminates mechanical collinearity with income (reducing the VIF to an acceptable level of ≈ 1-2 for the residuals), allowing for the correct isolation of the partial effect of each factor.

3. RESULTS

Table 2 presents the descriptive statistics for the scores of the five dimensions and the composite CRSI_EW across 61 jurisdictions. The mean values of the components range from 0.36 to 0.80. The lowest value is recorded for dimension P5 "Consumer Protection" (0.355), while the highest is observed for P2 "AML/CFT" (0.801), reflecting the early and widespread global implementation of anti-money laundering rules aligned with FATF standards. The composite index has a mean value of 0.652, a standard deviation of 0.279, a minimum of 0.000 (Bangladesh), and a maximum of 0.975 (France, Italy, and Spain).

Table 3 demonstrates the leading jurisdictions in the 2025 CRSI ranking (the complete list of 61 countries is provided in Appendix A). The top positions are occupied by a cluster of MiCA jurisdictions with additional national restrictions: France, Italy, and Spain share the first place with a score of 0.975 due to strict local rules (the AMF whitelist, CONSOB powers, and CNMV Circular 1/2022, respectively) operating on top of the baseline European regulation. The largest MiCA economies (Germany, the Netherlands, Sweden, Austria, Malta, Estonia) have a score of 0,950. Japan (0.900), Denmark, Poland, Portugal, Romania (0.892), as well as Belgium and Luxembourg (0.883) form the next tier of leaders.

The Cronbach's alpha coefficient for the 16 sub-indicators is 0.955, which significantly exceeds the 0,9 threshold and indicates excellent internal reliability of the index (Nunnally & Bernstein, 1994). The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy is 0.843, which surpasses the target threshold of 0,8 and is classified as "good" (Kaiser, 1974). Concurrently, Bartlett's test of sphericity firmly rejects the null hypothesis that the correlation matrix is an identity matrix ($X_2(120) \rightarrow \infty$; $p < 0.001$). Principal component analysis (PCA) extracts the first principal component, which explains 62,5% of the total variance, confirming the presence of a single dominant factor.

Table 2. Descriptive statistics of dimensions and the CRSI 2025 (n = 61)

Variable		Mean	S.D.	Min.	Q1	Median	Q3	Max.
P1	Legal Status	0.798	0.282	0.000	0.667	1.000	1.000	1.000
P2	AML / CFT	0.801	0.284	0.000	0.833	1.000	1.000	1.000
P3	Taxation	0.615	0.381	0.000	0.333	0.667	1.000	1.000
P4	Licensing and Supervision	0.694	0.336	0.000	0.333	0.833	1.000	1.000
P5	Consumer Protection	0.355	0.307	0.000	0.000	0.250	0.625	0.875
CRSI (Equal Weights)		0.652	0.279	0.000	0.492	0.758	0.883	0.975

Table 3. Top 15 jurisdictions by CRSI 2025*

Rank	Country	CRSI	P1	P2	P3	P4	P5	Chain.
1	France	0.975	1.000	1.000	1.000	1.000	0.875	22
1	Italy	0.975	1.000	1.000	1.000	1.000	0.875	36
1	Spain	0.975	1.000	1.000	1.000	1.000	0.875	31
4	Germany	0.950	1.000	1.000	1.000	1.000	0.750	21
4	Netherlands	0.950	1.000	1.000	1.000	1.000	0.750	39
4	Sweden	0.950	1.000	1.000	1.000	1.000	0.750	56
4	Austria	0.950	1.000	1.000	1.000	1.000	0.750	74
4	Malta	0.950	1.000	1.000	1.000	1.000	0.750	113
4	Estonia	0.950	1.000	1.000	1.000	1.000	0.750	96
10	Japan	0.900	1.000	1.000	1.000	1.000	0.500	19
11	Denmark	0.892	1.000	1.000	1.000	0.833	0.625	84
11	Poland	0.892	1.000	1.000	1.000	0.833	0.625	32
11	Portugal	0.892	1.000	1.000	1.000	0.833	0.625	45
11	Romania	0.892	1.000	1.000	0.833	1.000	0.625	33
15	Belgium	0.883	1.000	1.000	0.667	1.000	0.750	64
15	Luxembourg	0.883	1.000	1.000	0.667	1.000	0.750	116

Note: * The complete ranking is in Appendix A.

http://dx.doi.org/10.21511/bbs.21(2).2026.10

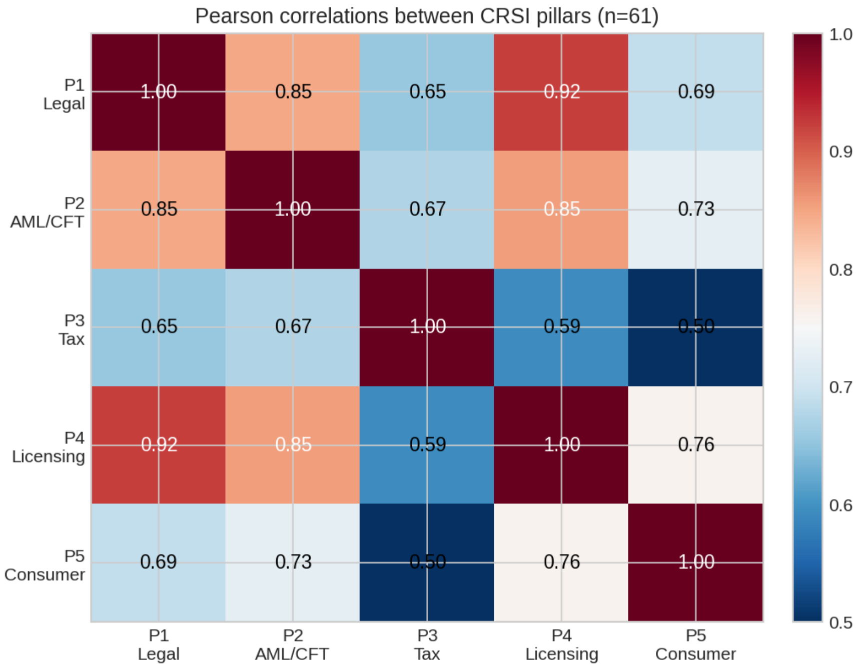

Figure 1. Heatmap of pairwise Pearson correlations among the five CRSI dimension scores

Table 4. Pairwise Pearson correlations among the CRSI dimension scores (n = 61)

Variable		P1	P2	P3	P4	P5
P1	Legal Status	1.000	0.847	0.654	0.922	0.688
P2	AML / CFT	0.847	1.000	0.674	0.854	0.726
P3	Taxation	0.654	0.674	1.000	0.593	0.501
P4	Licensing	0.922	0.854	0.593	1.000	0.758
P5	Consumer Protection	0.688	0.726	0.501	0.758	1.000

Pairwise correlations among the scores of the five dimensions (Table 4, Figure 1) range from 0.501 (P3 ↔ P5) to 0.922 (P1 ↔ P4). The consistently high level of interconnectedness among the dimensions justifies the use of a simple arithmetic mean: the final ranking is robust and does not undergo significant changes under alternative choices of weighting coefficients.

The unconditional Pearson correlation between the equally weighted index CRSI_EW and the inverse global adoption rank from Chainalysis is weak, standing at r = −0.087 (p = 0.506). Spearman's rank correlation also demonstrates the absence of a significant statistical relationship: = −0.185 (p = 0.154). Figure 2 provides a two-dimensional scatter plot visualizing the linear approximation of this relationship.

Figure 3 details the structure of this relationship by region and MiCA regulation implementation status. Panel A illustrates the median and interquartile range of CRSI scores: European jurisdictions are characterized by stably high indicators of regulatory stringency, whereas emerging markets demonstrate a significantly wider dispersion. Panel B reveals the conditional relationship between CRSI and the level of cryptocurrency adoption, color-coded by MiCA status. Among countries outside the MiCA jurisdiction (red markers), a weak negative trend is observed. In contrast, MiCA-regulated jurisdictions (blue markers) form a distinct cluster featuring high CRSI scores and moderate adoption. This identified pattern is key to formulating the econometric specification.

Table 5 presents three nested OLS specifications. Model 1 regresses the adoption index (ADP) solely on the CRSI index. Model 2 adds macroeconomic and institutional control variables (the logarithm of per capita GDP, financial freedom, the rule of law, and Internet penetration). Model 3 includes

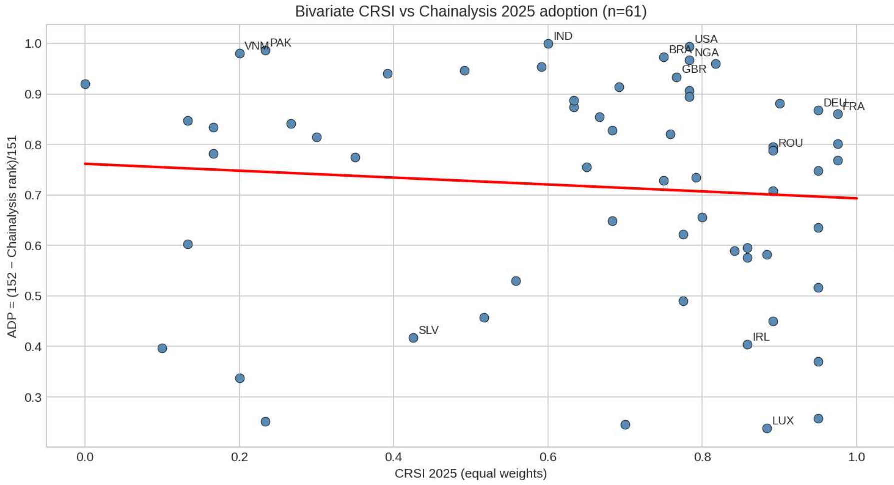

Figure 2. Two-dimensional scatter plot of CRSI_EW and Chainalysis 2025 inverse adoption rank (n = 61); the red line represents the linear approximation

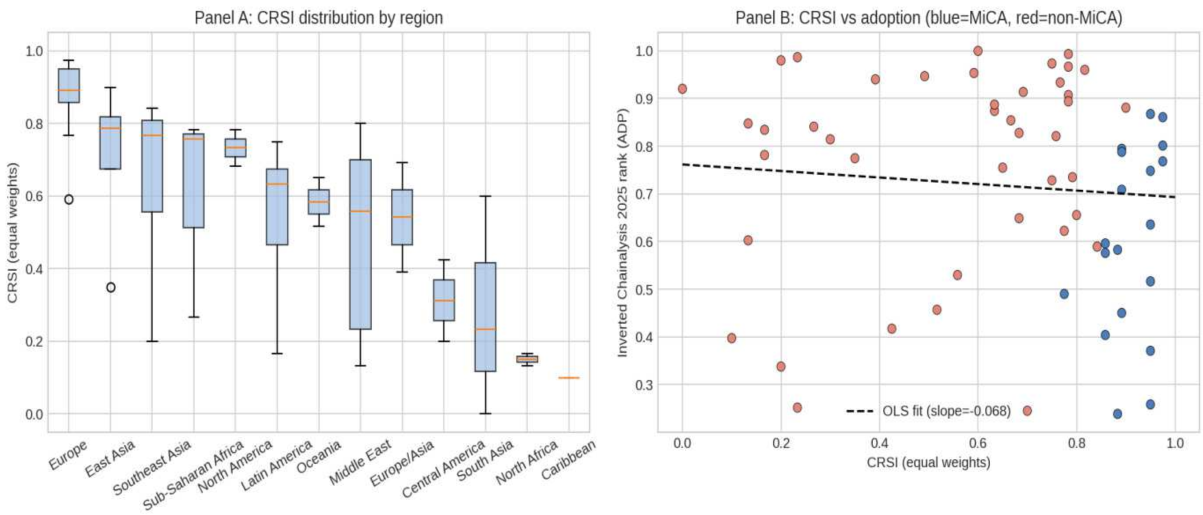

Figure 3. Distribution of CRSI by region (Panel A); CRSI vs. adoption differentiated by MiCA status (Panel B)

the MiCA indicator. All standard errors are calculated using the HC3 method to ensure robustness to heteroscedasticity.

The analysis allows for isolating three key findings. First, the unconditional coefficient of CRSI in Model 1 is small, negative, and statistically insignificant ($\beta = -0.068$, $p = 0.544$). Second, adding control variables shifts the sign of the effect to positive: in Model 2, the CRSI coefficient is +0.287 ($p = 0.013$), whereas the income level (logarithm of GDP) demonstrates a robust negative relationship with adoption ($\beta = -0.192$, $p < 0.001$)). Third, following the inclusion of the MiCA factor (Model 3), the positive impact of regulatory stringency intensifies: the coefficient increases to +0.393 ($p = 0.001$), which is further supported by the bootstrap interval [+0.172; +0.619]. Concurrently, the adjusted R^2 increases to 0.342.

The MiCA coefficient is negative and highly significant ($\beta = -0.171$, $p = 0.007$), This implies that, conditional on controlling for the CRSI level, MiCA jurisdictions lie below the regression surface. This result is a logical consequence of the MiCA design, which unifies rules across countries with advanced financial markets, where crypto-assets are forced to compete with an efficient traditional financial system (Zetzsche et al., 2021). Thus, the CRSI coefficient reflects the marginal relationship

http://dx.doi.org/10.21511/bbs.21(2).2026.10

Table 5. OLS regressions of the Chainalysis 2025 inverse adoption rank on CRSI and control variables

Variable	Model 1 (CRSI only)	Model 2 (+ controls)	Model 3 (+ MiCA)
CRSI_EW	−0.068 (0.112)	+0.287 (0.116)**	+0.393 (0.122)***
Log of per capita GDP	–	−0.192 (0.035)***	−0.171 (0.036)***
Financial freedom (residual)	–	−0.004 (0.003)	–
Rule of law (residual)	–	+0.006 (0.055)	–
Internet penetration (residual)	–	−0.000 (0.003)	−0.001 (0.003)
MiCA indicator	–	–	−0.171 (0.063)***
Constant	+0.762 (0.082)***	+2.532 (0.325)***	+2.291 (0.341)***
n	61	61	61
Adjusted R^2	−0.009	0.274	0.342
F-statistic (HC3)	0.38	7.01***	10.36***
Bootstrap 95% CI (CRSI)	[−0.273; +0.166]	[+0.044; +0.481]	[+0.172; +0.619]

Note: *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively, based on the HC3 t-statistics. The dependent variable is ADPi = (152 – ri) / 151, where ri is the 2025 Chainalysis rank. HC3 standard errors are in parentheses. 95% bootstrap confidence intervals are based on 1000 replications.

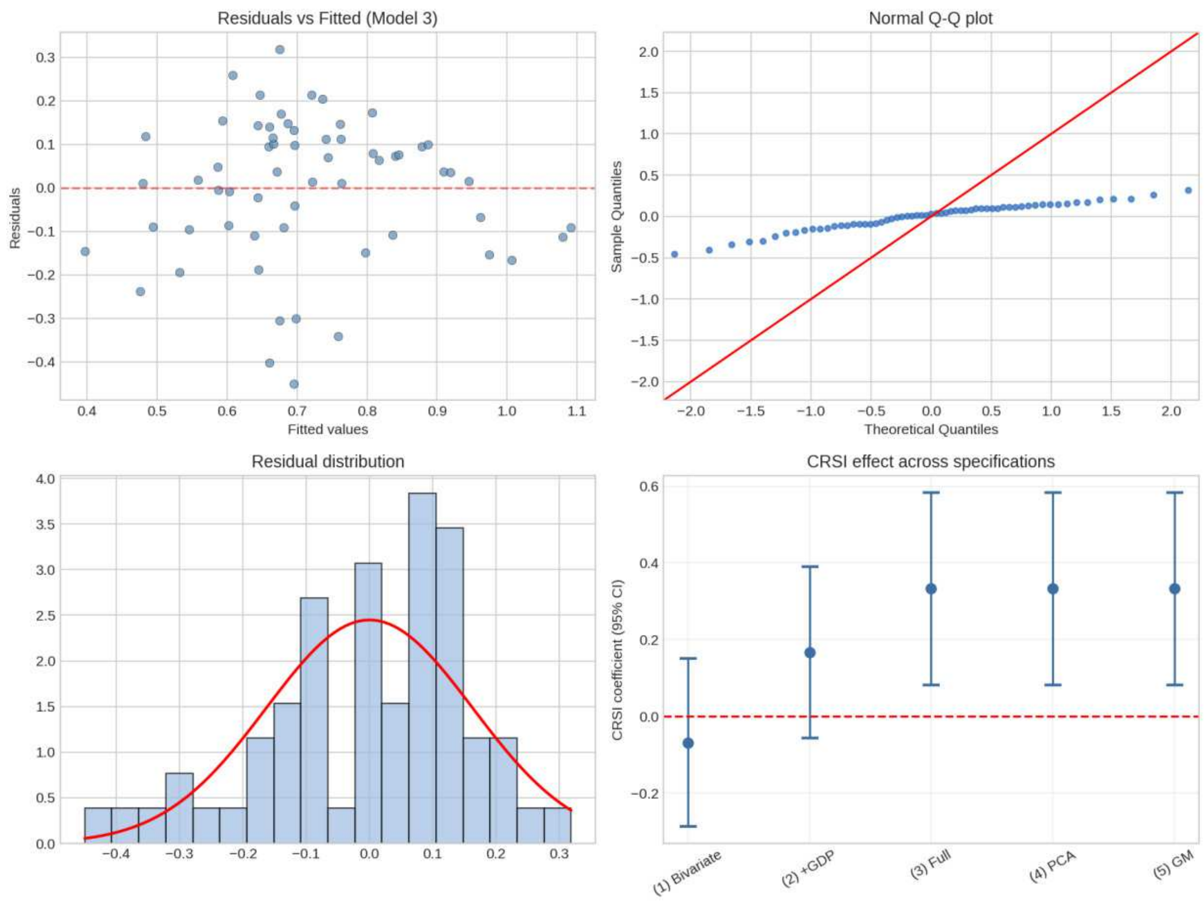

Figure 4. Regression diagnostics: residuals vs. fitted values, normal Q–Q plot, residual distribution, and comparison of the CRSI coefficient across different specifications (95% confidence intervals)

of incremental regulatory stringency with adoption under a fixed institutional choice (MiCA vs non-MiCA).

A series of diagnostic tests confirms the robustness of the identified pattern. First, the VIF values following the orthogonalization procedure do not exceed 8.8, which is below the conservative threshold of 10 (O'Brien, 2007) and indicates the absence of critical multicollinearity. Second, a jackknife analysis (the systematic exclusion of one country at a time) yields CRSI coefficient estimates within a stable range of [+0.226; +0.331], with no single jurisdiction altering the sign or significance of the effect.

Third, statistical tests confirm the specification adequacy: the Jarque-Bera test does not reject the hypothesis of residual normality (JB = 5.21; $p = 0.074$), and the Breusch-Pagan test indicates the absence of heteroscedasticity ($p = 0.869$). Crucially, Ramsey's RESET test firmly confirms the correctness of the model's linear form ($F = 0.79$; $p = 0.378$). Fourth, the ridge regression and alternative index aggregation methods (CRSI_PCA, CRSI_GM) maintain the positive direction of the effect. Taken together, the results indicate a compositional reversal consistent with a Simpson-type pattern (Kraay, 2018): at the global level, low income correlates with high adoption and weak regulation, yet within similar economic groups, stricter regulation is positively associated with market activity.

4. DISCUSSION

The central empirical finding is the identification of an unconditionally negative yet statistically insignificant relationship between the CRSI and cryptocurrency adoption, which reverses its direction to positive and significant when controlling for income levels and digital infrastructure. This result refutes the conventional version of the "regulatory arbitrage" hypothesis and provides evidence in favor of the notion that the regulatory environment and market activity develop synchronously. When comparing countries with comparable levels of macroeconomic development, financial freedom, and digital infrastructure, jurisdictions with a more robust regulatory framework demonstrate higher levels of on-chain adoption. This mechanism is entirely consistent with foundational works on the role of legal institutions (La Porta et al., 1998; Levine, 1999) and the conclusions of Allen et al. (2022) regarding the institutional prerequisites for the development of digital asset markets.

The identified compositional reversal, suggestive of a Simpson-type pattern, has significant empirical importance. The unconditional cross-country correlation reflects a compositional effect: jurisdictions with low-income levels are generally characterized by higher peer-to-peer (P2P) activity and simultaneously weaker regulation. At the global level, this effect dominates the partial relationship between regulation and adoption. This shift is analogous to the omitted variable problem described by Kraay (2018) regarding governance indicators and Doing Business assessments, which once again underlines the critical importance of using multivariate econometric specifications with a proper set of covariates.

The negative coefficient of the MiCA indicator ($\beta = -0.171$; $p = 0.007$) has a logical economic interpretation. The MiCA regulation harmonizes rules primarily in countries with mature financial markets, where crypto-assets are forced to compete with a highly developed traditional banking system. Therefore, strengthening regulation within the framework of MiCA does not translate into a proportional increase in digital asset adoption. This is fully consistent with the position of Zetzsche et al. (2021), who emphasize that the primary goal of MiCA is to ensure market integrity and consumer protection, rather than to artificially stimulate crypto activity. Accordingly, Howell et al. (2020) and Allen et al. (2022) also emphasize that the social welfare benefits from regulation are derived from improving the quality, rather than purely the quantity, of market transactions.

This study supplements the literature dedicated to the relationship between regulation and market activity. Previously, Cumming et al. (2019) captured the first regulatory wave following the ICO boom, albeit without an econometric evaluation of its impact on the adoption level. Auer and Claessens (2020), as well as Borri and Shakhnov (2020), focused on short-term price reactions in response to regulatory events, while Auer et al. (2022a) investigated the local conse-

http://dx.doi.org/10.21511/bbs.21(2).2026.10

quences of the Chinese ban. The closest predecessor is the work of Howell et al. (2020), which identified a positive correlation between ICO success and regulatory infrastructure. This study extends that finding: from the level of individual issuers to the macro level of entire countries, and from the narrow ICO segment to the broader global on-chain economy. In the context of composite indicator construction, the approach demonstrated in this work is methodologically akin to the building principles of the Doing Business index (Djankov et al., 2002), the IMF Financial Development Index (Svirydzenka, 2016), and the regulatory matrix of Cumming et al. (2019).

The results of the study have three key policy implications. First, for regulators considering the implementation of comprehensive frameworks (such as harmonization under the MiCA standard): conditional on controlling for the level of economic development and digital infrastructure, stricter rules do not lead to a decrease in the level of crypto-asset adoption. Moreover, among countries with comparable income levels, stricter regulation is positively associated with market activity. Consequently, apprehensions regarding an immediate "regulatory flight" resulting from the introduction of clear and rigorous rules find no empirical support in the 2025 data.

Second, for academic literature on comparative regulation: digital asset global adoption metrics must be evaluated against regulatory variables strictly based on conditional rather than unconditional relationships to avoid compositional distortions. Third, for institutional actors and market participants: the developed five-component structure of the CRSI demonstrates that regulatory due diligence cannot be reduced to a single dimension. For instance, certain jurisdictions in the Middle East and North Africa (MENA) region, such as Saudi Arabia, Egypt, or Morocco, display satisfactory scores in the field of AML/CFT, yet demonstrate critically low indicators of consumer protection, which creates hidden compliance risks for retail investors.

This study is subject to several limitations. First, the CRSI reflects a cross-section of the regulatory environment as of 2025. The regulatory landscape for crypto-assets is undergoing rapid transformation; In particular, U.S. federal legislation is undergoing pivotal reform: the Financial Innovation and Technology for the 21st Century Act (FIT21, H.R. 4763, 118th Congress (U.S. Congress, 2024)) passed the House of Representatives in May 2024 and establishes a CFTC-SEC jurisdictional framework for digital commodities; the Guiding and Establishing National Innovation for U.S. Stablecoins Act (GENIUS Act, S. 1582, 119th Congress (U.S. Congress, 2025)) advanced through the Senate in 2025 and introduces a federal licensing regime for payment stablecoin issuers; and the SEC rescinded Staff Accounting Bulletin No. 121 through SAB No. 122 (January 2025), which alters how regulated entities account for safeguarded crypto-assets. Any of these developments could shift CRSI scores for the United States in subsequent updates. Second, the coding methodology for sub-indicators relies on the existence of formal rules (*de jure*) but does not directly measure the intensity and quality of their practical enforcement. Future research could supplement the CRSI with a distinct enforcement index (Kahn et al., 2024).

Third, the baseline Chainalysis index is constrained by its ability to monitor flows primarily from centralized exchanges (CEX) and open DeFi protocols; fully anonymous activity (privacy coins) and over-the-counter (OTC) flows may not be fully captured. Fourth, the research design is cross-sectional. Although a comprehensive panel of control variables was utilized, this design cannot entirely resolve the endogeneity problem (specifically, reverse causality, where high adoption levels prompt governments to tighten regulation). Precise identification of causal mechanisms requires instrumental variables or panel data.

The analysis opens up four promising avenues for further scholarly investigation:

1. Constructing a CRSI panel dataset starting from 2017 to facilitate the within-country identification of dynamic effects resulting from the implementation of new regulatory rules.

2. Utilizing exchange-level transaction data to verify whether the identified relationship between the CRSI and adoption is mediated primarily through centralized platforms, the decentralized finance (DeFi) sector, or both channels.

3. Conducting a comprehensive assessment that systematically balances regulatory costs against the economic benefits derived from consumer protection and systemic risk mitigation, following the framework of Allen et al. (2022).
4. Investigating the interconnectedness between the regulatory stringency of decentralized crypto-assets and the development policies of central bank digital currencies (CBDCs), which is highly relevant given the rapid expansion of the corresponding literature (Auer et al., 2022b; Bindseil & Senner, 2024).

CONCLUSION

The objective of this study was to provide a comprehensive empirical assessment of the impact of state regulatory stringency on cryptocurrency market adoption across 61 countries (jurisdictions). To achieve this objective, a composite instrument – the Crypto Regulation Stringency Index (CRSI) – was applied, demonstrating high internal reliability ($\alpha = 0.955$) and a distinct unifactorial structure. The primary empirical finding revealed a compositional reversal in the relationship between regulatory stringency and adoption, consistent with a Simpson-type pattern when evaluating market outcomes: although the unconditional correlation between rule strictness and adoption is weak due to compositional bias, multivariate modeling (OLS HC3) demonstrated that when controlling for the level of economic development and digital infrastructure, an increase in regulatory stringency has a robust positive and statistically significant relationship with digital asset adoption metrics ($\beta = +0.393$; $p = 0.001$, adjusted $R^2 = 0.342$). Concurrently, the econometric analysis captured a specific negative effect of the MiCA indicator ($\beta = -0.171$; $p = 0.007$), which is explained by the intense competition between digital assets and the developed traditional financial system in European countries.

The scientific novelty of the work lies in the theoretical and empirical substantiation of the “Legal Foundations” concept concerning a new class of digital assets, and in the cross-country refutation of the “regulatory outflow” hypothesis. The obtained results prove that a clear and stringent legal framework does not suppress market activity, but on the contrary, serves as its reliable institutional foundation, which minimizes fraud risks and reduces overall uncertainty for investors. The robustness of the identified patterns is confirmed by a series of robustness tests, including jackknife analysis, ridge regression, and the application of alternative index aggregation methods (via principal component analysis and geometric mean), which reinforces the methodological validity of the formulated scientific statements.

The practical application of the results obtained is oriented toward national regulators, lawmakers, and institutional market participants, as it provides them with substantiated grounds for implementing comprehensive compliance procedures without the risk of depressing legitimate financial activity. Future research avenues should focus on expanding the analytical framework along the temporal dimension by constructing CRSI panel data to identify dynamic effects within individual countries. Furthermore, it is promising to integrate transaction-level microdata from specific trading platforms and DeFi protocols, as well as to conduct a full-scale social welfare analysis to quantitatively evaluate the balance between regulatory compliance costs and the long-term benefits of mitigating systemic market risks.

AUTHOR CONTRIBUTIONS

Conceptualization: Maksym Ivasenko, Natalia Pavlova.
Data curation: Maksym Ivasenko, Serhiy Frolov, Natalia Pavlova.
Formal analysis: Serhiy Frolov, Tetiana Tereshchenko.
Funding acquisition: Viktoriia Datsenko.
Investigation: Maksym Ivasenko.

http://dx.doi.org/10.21511/bbs.21(2).2026.10

Methodology: Maksym Ivasenko, Serhiy Frolov, Viktoriia Datsenko, Tetiana Tereshchenko.
Project administration: Serhiy Frolov, Viktoriia Datsenko.
Resources: Serhiy Frolov, Tetiana Tereshchenko, Natalia Pavlova.
Software: Maksym Ivasenko.
Supervision: Serhiy Frolov, Viktoriia Datsenko, Natalia Pavlova.
Validation: Viktoriia Datsenko, Tetiana Tereshchenko.
Visualization: Maksym Ivasenko, Tetiana Tereshchenko, Natalia Pavlova.
Writing – original draft: Maksym Ivasenko.
Writing – review & editing: Serhiy Frolov, Viktoriia Datsenko, Tetiana Tereshchenko, Natalia Pavlova.

REFERENCES

1. Adrian, T., & Mancini-Griffoli, T. (2021). The rise of digital money. *Annual Review of Financial Economics, 13*(1), 57-77. https://doi.org/10.1146/annurev-financial-101620-063859
2. Allen, F., Gu, X., & Jagtiani, J. (2022). Fintech, cryptocurrencies, and CBDC: Financial structural transformation in China. *Journal of International Money and Finance, 124,* 102625. https://doi.org/10.1016/j.jimonfin.2022.102625
3. Auer, R., & Claessens, S. (2018). Regulating cryptocurrencies: Assessing market reactions. *BIS Quarterly Review, 2018,* 51-65. Retrieved from https://www.bis.org/publ/qtrpdf/r_qt1809f.pdf
4. Auer, R., Cornelli, G., & Frost, J. (2022a). *The pandemic, cash, and retail payment behaviour: Insights from the future of payments database* (BIS Working Papers No 1055). Retrieved from https://www.bis.org/publ/work1055.pdf
5. Auer, R., Frost, J., Gambacorta, L., Monnet, C., Rice, T., & Shin, H. S. (2022b). Central bank digital currencies: Motives, economic implications, and the research frontier. *Annual Review of Economics, 14*(1), 697-721. https://doi.org/10.1146/annurev-economics-051420-020324
6. Bhimani, A., Hausken, K., & Arif, S. (2022). Do national development factors affect cryptocurrency adoption? *Technological Forecasting and Social Change, 181,* 121739. https://doi.org/10.1016/j.techfore.2022.121739
7. Bianchi, D., & Babiak, M. (2022). On the performance of cryptocurrency funds. *Journal of Banking & Finance, 138,* 106467. https://doi.org/10.1016/j.jbankfin.2022.106467
8. Bindseil, U., & Senner, R. (2024). *Destabilisation of bank deposits across destinations: Assessment and policy implications* (ECB Working Paper No. 2887). Retrieved from https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2887~845e136b3b.en.pdf
9. Borri, N., & Shakhnov, K. (2020). Regulation spillovers across cryptocurrency markets. *Finance Research Letters, 36,* 101333. https://doi.org/10.1016/j.frl.2019.101333
10. Breusch, T. S., & Pagan, A. R. (1979). A simple test for heteroscedasticity and random coefficient variation. *Econometrica, 47*(5), 1287-1294. https://doi.org/10.2307/1911963
11. Brunnermeier, M. K., James, H., & Landau, J.-P. (2019). *The digitalization of money* (NBER Working Paper No. 26300). https://doi.org/10.3386/w26300
12. Casadio Tarabusi, E., & Guarini, G. (2013). An unbalance adjustment method for development indicators. *Social Indicators Research, 112*(1), 19-45. https://doi.org/10.1007/s11205-012-0070-4
13. Chainalysis. (2025). *The 2025 Global Adoption Index: India and the United States Lead Cryptocurrency Adoption.* Chainalysis Inc. Retrieved from https://www.chainalysis.com/blog/2025-global-crypto-adoption-index/
14. Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika, 16*(3), 297-334. https://doi.org/10.1007/BF02310555
15. Cumming, D. J., Johan, S., & Pant, A. (2019). Regulation of the crypto-economy: Managing risks, challenges, and regulatory uncertainty. *Journal of Risk and Financial Management, 12*(3), 126. https://doi.org/10.3390/jrfm12030126
16. Cumming, D. J., Johan, S., & Reardon, R. (2023). Global fintech trends and their impact on international business: A review. *Multinational Business Review, 31*(3), 413-436. https://doi.org/10.1108/MBR-05-2023-0077
17. Davidson, R., & MacKinnon, J. G. (1993). *Estimation and inference in econometrics.* Oxford University Press.
18. Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2002). The regulation of entry. *Quarterly Journal of Economics, 117*(1), 1-37. https://doi.org/10.1162/003355302753399436
19. Djankov, S., La Porta, R., Lopez-de-Silanes, F., & Shleifer, A. (2003). Courts. *Quarterly Journal of Economics, 118*(2), 453-517. https://doi.org/10.1162/003355303321675437
20. Efron, B., & Tibshirani, R. J. (1993). *An introduction to the bootstrap*. Chapman & Hall.
21. European Union (EU). (2023). Regulation (EU) 2023/1114 of the European Parliament and of the Council of 31 May 2023 on

markets in crypto-assets (MiCA). *Official Journal of the European Union, L 150/40,* 205. Retrieved from https://eur-lex.europa.eu/eli/reg/2023/1114/oj

22. Ferreira, A., & Sandner, P. (2021). EU search for regulatory answers to crypto assets and their place in the financial markets' infrastructure. *Computer Law & Security Review, 43,* 105632. https://doi.org/10.1016/j.clsr.2021.105632

23. Feyen, E., Kawashima, Y., & Mittal, R. (2022). *Crypto-assets activity around the world: Evolution and macro-financial drivers* (Policy Research Working Paper No. 9962). World Bank. https://doi.org/10.1596/1813-9450-9962

24. Financial Action Task Force (FATF). (2021). *Updated guidance for a risk-based approach to virtual assets and virtual asset service providers.* FATF/OECD. Retrieved from https://www.fatf-gafi.org/en/publications/Fatfrecommendations/Guidance-rba-virtual-assets-2021.html

25. Frisch, R., & Waugh, F. V. (1933). Partial time regressions as compared with individual trends. *Econometrica, 1*(4), 387-401. https://doi.org/10.2307/1907330

26. Hairudin, A., Sifat, I. M., Mohamad, A., & Yusof, Y. (2022). Cryptocurrencies: A survey on acceptance, governance and market dynamics. *International Journal of Finance & Economics, 27*(4), 4633-4659. https://doi.org/10.1002/ijfe.2392

27. Halaburda, H., Haeringer, G., Gans, J., & Gandal, N. (2022). The microeconomics of cryptocurrencies. *Journal of Economic Literature, 60*(3), 971-1013. https://doi.org/10.1257/jel.20201593

28. Hassan, T. A., Hollander, S., van Lent, L., & Tahoun, A. (2019). Firm-level political risk: Measurement and effects. *Quarterly Journal of Economics, 134*(4), 2135-2202. https://doi.org/10.1093/qje/qjz021

29. Hoerl, A. E., & Kennard, R. W. (1970). Ridge regression: Biased estimation for nonorthogonal problems. *Technometrics, 12*(1), 55-67. https://doi.org/10.1080/00401706.1970.10488634

30. Houben, R., & Snyers, A. (2018). *Cryptocurrencies and blockchain: Legal context and implications for financial crime, money laundering and tax evasion*. European Parliament. Retrieved from https://www.europarl.europa.eu/cmsdata/150761/TAX3%20Study%20on%20cryptocurrencies%20and%20blockchain.pdf

31. Howell, S. T., Niessner, M., & Yermack, D. (2020). Initial coin offerings: Financing growth with cryptocurrency token sales. *Review of Financial Studies, 33*(9), 3925-3974. https://doi.org/10.1093/rfs/hhz131

32. International Telecommunication Union (ITU). (2024). *Measuring digital development: Facts and figures 2024*. ITU Publications. Retrieved from https://digitallibrary.un.org/record/4074377

33. Ivasenko, M., Frolov, S., Heyenko, M., Kolodnenko, N., & Datsenko, V. (2025). Operational cost savings: Blockchain-driven back-office automation and syndicated loan growth in U.S. banks. *Banks and Bank Systems, 20*(2), 189-205. https://doi.org/10.21511/bbs.20(2).2025.16

34. Jarque, C. M., & Bera, A. K. (1980). Efficient tests for normality, homoscedasticity and serial independence of regression residuals. *Economics Letters, 6*(3), 255-259. https://doi.org/10.1016/0165-1765(80)90024-5

35. Kahn, C. M., van Oordt, M. R. C., & Zhu, Y. (2024). Best before? Expiring central bank digital currency and loss recovery. *Journal of Money, Credit and Banking, 58*(3), 787-819. https://doi.org/10.1111/jmcb.13208

36. Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 39*(1), 31-36. https://doi.org/10.1007/BF02291575

37. Kraay, A. (2018). *Methodology for a World Bank Human Capital Index* (Policy Research Working Paper No. 8593). World Bank. https://doi.org/10.1596/1813-9450-8593

38. La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1997). Legal determinants of external finance. *Journal of Finance, 52*(3), 1131-1150. https://doi.org/10.1111/j.1540-6261.1997.tb02727.x

39. La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. W. (1998). Law and finance. *Journal of Political Economy, 106*(6), 1113-1155. https://doi.org/10.1086/250042

40. Levine, R. (1999). Law, finance, and economic growth. *Journal of Financial Intermediation, 8*(1-2), 8-35. https://doi.org/10.1006/jfin.1998.0255

41. Liu, Y., & Tsyvinski, A. (2021). Risks and returns of cryptocurrency. *Review of Financial Studies, 34*(6), 2689-2727. https://doi.org/10.1093/rfs/hhaa113

42. Liu, Y., Tsyvinski, A., & Wu, X. (2022). Common risk factors in cryptocurrency. *Journal of Finance, 77*(2), 1133-1177. https://doi.org/10.1111/jofi.13119

43. Long, J. S., & Ervin, L. H. (2000). Using heteroscedasticity-consistent standard errors in the linear regression model. *The American Statistician, 54*(3), 217-224. https://doi.org/10.1080/00031305.2000.10474549

44. Lovell, M. C. (1963). Seasonal adjustment of economic time series and multiple regression analysis. *Journal of the American Statistical Association, 58*(304), 993-1010. https://doi.org/10.1080/01621459.1963.10480682

45. Manela, A., & Moreira, A. (2017). News implied volatility and disaster concerns. *Journal of Financial Economics, 123*(1), 137-162. https://doi.org/10.1016/j.jfineco.2016.01.032

46. Maume, P. (2023). The Regulation on Markets in Crypto-Assets (MiCAR): Landmark Codification, or First Step of Many, or Both? *European Company and Financial Law Review, 20*(2), 243-275. https://doi.org/10.1515/ecfr-2023-0014

47. Mazziotta, M., & Pareto, A. (2016). On a generalized non-compensatory composite index for measur-

ing socio-economic phenomena. *Social Indicators Research, 127*(3), 983-1003. https://doi.org/10.1007/s11205-015-0998-2

48. Nardo, M., Saisana, M., Saltelli, A., Tarantola, S., Hoffman, A., & Giovannini, E. (2008). *Handbook on constructing composite indicators: Methodology and user guide.* OECD Publishing. https://doi.org/10.1787/9789264043466-en
49. Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric theory* (3rd ed.). McGraw-Hill.
50. O'Brien, R. M. (2007). A caution regarding rules of thumb for variance inflation factors. *Quality & Quantity, 41*(5), 673-690. https://doi.org/10.1007/s11135-006-9018-6
51. Ramsey, J. B. (1969). Tests for specification errors in classical linear least-squares regression analysis. *Journal of the Royal Statistical Society Series B, 31*(2), 350-371. https://doi.org/10.1111/j.2517-6161.1969.tb00796.x
52. Saiedi, E., Broström, A., & Ruiz, F. (2021). Global drivers of cryptocurrency infrastructure adoption. *Small Business Economics, 57,* 353-406. https://doi.org/10.1007/s11187-019-00309-8
53. Saisana, M., & Tarantola, S. (2002). State-of-the-art report on current methodologies and practices for composite indicator development. EUR 20408 EN, European Commission–JRC. Retrieved from https://op.europa.eu/en/publication-detail/-/publication/9253d939-b47b-4428-b792-619e6b6c8645
54. Saisana, M., Saltelli, A., & Tarantola, S. (2005). Uncertainty and sensitivity analysis techniques as tools for the quality assessment of composite indicators. *Journal of the Royal Statistical Society Series A, 168*(2), 307-323. https://doi.org/10.1111/j.1467-985X.2005.00350.x
55. Svirydzenka, K. (2016). *Introducing a new broad-based index of financial development* (IMF Working Paper No. WP/16/5). Retrieved from https://www.imf.org/external/pubs/ft/wp/2016/wp1605.pdf
56. U.S. Congress. (2024). *Financial Innovation and Technology for the 21st Century Act* (H.R. 4763, 118th Congress). Retrieved from https://www.congress.gov/bill/118th-congress/house-bill/4763
57. U.S. Congress. (2025). *Guiding and Establishing National Innovation for U.S. Stablecoins Act of 2025* (S. 1582, 119th Congress). Retrieved from https://www.congress.gov/bill/119th-congress/senate-bill/1582
58. U.S. Securities and Exchange Commission. (2025). *Staff Accounting Bulletin No. 122* (Release No. SAB 122, 23 January 2025). Retrieved from https://www.sec.gov/rules-regulations/staff-guidance/staff-accounting-bulletins/staff-accounting-bulletin-122
59. Zetzsche, D. A., Annunziata, F., Arner, D. W., & Buckley, R. P. (2021). The Markets in Crypto-Assets regulation (MiCA) and the EU digital finance strategy. *Capital Markets Law Journal, 16*(2), 203-225. https://doi.org/10.1093/cmlj/kmab005

APPENDIX A. Complete ranking of 61 jurisdictions by CRSI 2025

Table A1. Complete CRSI 2025 ranking with scores across five dimensions and the original 2025 Chainalysis rank

Rank	Country	ISO	CRSI	P1	P2	P3	P4	P5	Chain.
1	France	FRA	0.975	1	1	1	1	0.875	22
1	Italy	ITA	0.975	1	1	1	1	0.875	36
1	Spain	ESP	0.975	1	1	1	1	0.875	31
4	Germany	DEU	0.95	1	1	1	1	0.75	21
4	Netherlands	NLD	0.95	1	1	1	1	0.75	39
4	Sweden	SWE	0.95	1	1	1	1	0.75	56
4	Austria	AUT	0.95	1	1	1	1	0.75	74
4	Malta	MLT	0.95	1	1	1	1	0.75	113
4	Estonia	EST	0.95	1	1	1	1	0.75	96
10	Japan	JPN	0.9	1	1	1	1	0.5	19
11	Denmark	DNK	0.892	1	1	1	0.833	0.625	84
11	Poland	POL	0.892	1	1	1	0.833	0.625	32
11	Portugal	PRT	0.892	1	1	1	0.833	0.625	45
11	Romania	ROU	0.892	1	1	0.833	1	0.625	33
15	Belgium	BEL	0.883	1	1	0.667	1	0.75	64
15	Luxembourg	LUX	0.883	1	1	0.667	1	0.75	116
17	Finland	FIN	0.858	1	1	0.833	0.833	0.625	65
17	Czechia	CZE	0.858	1	1	0.833	0.833	0.625	62
17	Ireland	IRL	0.858	1	1	0.833	0.833	0.625	91
20	Singapore	SGP	0.842	1	1	0.333	1	0.875	63
21	Indonesia	IDN	0.817	1	0.833	1	1	0.25	7
22	UAE	ARE	0.8	1	1	0.5	1	0.5	53
23	Hong Kong	HKG	0.792	1	1	0.333	1	0.625	41
24	Thailand	THA	0.783	1	0.833	1	0.833	0.25	17
24	Nigeria	NGA	0.783	1	0.833	1	0.833	0.25	6
24	USA	USA	0.783	1	1	1	0.667	0.25	2
24	South Korea	KOR	0.783	1	1	0.167	1	0.75	15
28	Norway	NOR	0.775	0.833	1	0.833	0.833	0.375	78
28	Switzerland	CHE	0.775	1	1	0.5	1	0.375	58
30	United Kingdom	GBR	0.767	0.833	1	0.667	0.833	0.5	11
31	South Africa	ZAF	0.758	1	1	0.833	0.833	0.125	28
32	Brazil	BRA	0.75	0.833	0.833	1	0.833	0.25	5
32	Malaysia	MYS	0.75	1	1	0.667	0.833	0.25	42
34	Bahrain	BHR	0.7	1	1	0	1	0.5	115
35	Turkey	TUR	0.692	1	1	0.333	1	0.125	14
36	Chile	CHL	0.683	0.833	0.833	0.667	0.833	0.25	54
36	Canada	CAN	0.683	0.833	1	0.667	0.667	0.25	27
38	Mexico	MEX	0.667	0.833	0.833	0.833	0.833	0	23
39	Australia	AUS	0.65	0.667	1	0.667	0.667	0.25	38
40	Argentina	ARG	0.633	0.833	0.833	0.667	0.833	0	20
40	Venezuela	VEN	0.633	0.833	0.667	0.833	0.833	0	18
42	India	IND	0.6	0.833	0.833	1	0.333	0	1
43	Ukraine	UKR	0.592	0.833	0.833	0.833	0.333	0.125	8
44	Israel	ISR	0.558	0.667	0.833	0.667	0.5	0.125	72
45	New Zealand	NZL	0.517	0.5	0.833	0.667	0.333	0.25	83
46	Philippines	PHL	0.492	0.667	0.833	0.333	0.5	0.125	9
47	El Salvador	SLV	0.425	1	0.333	0	0.667	0.125	89
48	Russia	RUS	0.392	0.667	0.333	0.5	0.333	0.125	10
49	China	CHN	0.35	0.333	0.333	0	0.833	0.25	35
50	Colombia	COL	0.3	0.5	0.333	0.333	0.333	0	29
51	Kenya	KEN	0.267	0.167	0.333	0.833	0	0	25
52	Qatar	QAT	0.233	0.5	0.333	0	0.333	0	114

http://dx.doi.org/10.21511/bbs.21(2).2026.10

Table A1 (cont.). Complete CRSI 2025 ranking with scores across five dimensions and the original 2025 Chainalysis rank

Rank	Country	ISO	CRSI	P1	P2	P3	P4	P5	Chain.
52	Pakistan	PAK	0.233	0.5	0.333	0	0.333	0	3
54	Vietnam	VNM	0.2	0.333	0.333	0	0.333	0	4
54	Panama	PAN	0.2	0.5	0.333	0	0.167	0	101
56	Egypt	EGY	0.167	0.333	0.333	0	0.167	0	26
56	Peru	PER	0.167	0.333	0.333	0.167	0	0	34
58	Saudi Arabia	SAU	0.133	0.167	0.333	0	0.167	0	61
58	Morocco	MAR	0.133	0.333	0.333	0	0	0	24
60	Jamaica	JAM	0.1	0.167	0.333	0	0	0	92
61	Bangladesh	BGD	0	0	0	0	0	0	13

Note: P1 – Legal Status, P2 – AML/CFT, P3 – Taxation, P4 — Licensing and Supervision, P5 – Consumer Protection. CRSI – equally weighted average of the five dimensions. The "Chain." column presents the country's original rank in the Chainalysis 2025 Global Crypto Adoption Index (lower rank = higher adoption).

APPENDIX B. CRSI index structure and coding rules (Codebook)

Table B1. Sub-indicator system and evaluation criteria of the CRSI index

No.	Pillar	Variable	Description (EN)
1.	Legal Status	P1V1	Is cryptocurrency legal for individuals to hold and trade?
		P1V2	Does the legal system have a formal classification for crypto (property, commodity, financial instrument, VDA, etc.)?
		P1V3	Is there a dedicated law specifically for crypto/virtual assets (not just application of existing laws)?
2.	AML/KYC	P2V1	Are crypto exchanges/VASPs explicitly subject to AML/CFT obligations under national law?
		P2V2	Are crypto service providers required to perform KYC/CDD on customers?
		P2V3	Has the FATF Travel Rule for virtual asset transfers been implemented in national law and enforced?
3.	Taxation	P3V1	Are gains/income from cryptocurrency transactions subject to taxation?
		P3V2	Are there specific tax norms for crypto written into the tax code (not just administrative guidance or interpretation)?
		P3V3	Are crypto exchanges/platforms required to report transaction data to tax authorities?
4.	Licensing	P4V1	Must crypto exchanges/VASPs obtain a license or formal registration to operate legally?
		P4V2	Is there a clearly designated single regulatory authority responsible for crypto supervision?
		P4V3	Are there prudential requirements (minimum capital, reserves, asset segregation) for crypto service providers?
5.	Consumer Protection	P5V1	Are there mandatory disclosure/whitepaper requirements for token offerings (ICO, IEO, etc.)?
		P5V2	Are there restrictions on marketing/advertising of crypto products to retail investors?
		P5V3	Is there a formal complaint/dispute resolution mechanism (ombudsman, ADR) accessible to crypto investors?
		P5V4	Are there restrictions on retail investor access to crypto (investment limits, suitability requirements, risk warnings)?