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The Reality of Using Electronic and Virtual Money and Its Impacts on the Global Economy, A Descriptive Analytical Study of Monetary, Economic, and Financial Implications

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Abstract*—This research paper aims to examine the theoretical frameworks of electronic money (e-money) and virtual currency, highlighting their significance, mechanisms of operation, and practical adoption across various countries worldwide. By employing a descriptive-analytical approach, this study evaluates the multifaceted monetary, economic, and financial implications arising from the expanding adoption of digital monetary forms. The findings reveal that despite technical, regulatory, and security challenges, electronic and virtual currencies have successfully asserted themselves within the international monetary and financial system as medium of exchange, unit of account, and store of value. Conversely, the analysis indicates that Algeria remains substantially detached from active engagement with electronic and virtual payment systems, constrained by an interplay of technical infrastructure deficiencies, economic-financial hurdles, and regulatory gaps.*
Keywords: *Electronic Money, Virtual Money, Bitcoin, Economic Effects, Monetary Policy, Financial Stability, Central Banking.*

1. Introduction

The global banking industry has undergone a profound structural transformation in recent decades. A primary indicator of this evolution is the transition toward online commercial transactions, facilitated by electronic payment mechanisms provided by banking institutions. Beyond conventional electronic payment platforms, modern financial technological advancements have given rise to electronic money (e-money) and decentralized virtual currencies. Over a long-term horizon, these modern monetary instruments are increasingly anticipated to displace traditional legal tender Consequently, the widespread proliferation and adoption of digital money generate significant macroeconomic, monetary, and fiscal ramifications for national economies.

1.1 Research Problem

What are the monetary, economic, and financial effects resulting from the expanding adoption and circulation of electronic and virtual money within the global economy?

1.2 Objectives of the Study

- To clarify the theoretical conceptual frameworks governing electronic and virtual currencies.
- To analyze the empirical reality and adoption patterns of electronic and virtual money across selected global economies.
- To systematically identify and classify the macroeconomic, monetary, and financial challenges and implications stemming from digital currency usage.

1.3 Structure of the Research

To address the central problem, the study is structured into four main axes:

- Section 1: Conceptual Framework of Electronic Money.
- Section 2: Conceptual Framework of Virtual Money (Bitcoin as a Model).
- Section 3: The Empirical Reality of Electronic and Virtual Money Globally.

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- Section 4: Monetary, Economic, and Financial Implications on Global Economies.
- Section 5: Conclusion, Key Findings, and Strategic Recommendations.

2. Conceptual Framework of Electronic Money

Electronic money represents one of the most innovative advancements in modernizing commercial settlement systems. It aims to facilitate seamless fund transfers, reduce physical currency issuance costs, and provide enhanced cryptographic security for financial claims (Wafa, 2003).

2.1 Definition of Electronic Money

Scholarly definitions of electronic money vary considerably due to the diverse technologies and evolving mechanisms underlying electronic fund transfers (Abdel Salam, 2006; Dabbeh, 2010).

- **Bank for International Settlements (BIS):** Electronic money consists of monetary value units stored electronically on an electronic device in the possession of the holder, designed for executing transaction settlements (Bank for International Settlements [BIS], 1998; Al-Jneibi & Al-Jneibi, 2006).
- **Economic and Social Committee of the EU:** A set of magnetically and electronically coded information technology solutions that enable paperless transfer of funds. This system requires a tripartite relationship involving the issuer (bank or financial institution), the beneficiary (merchant accepting the payment), and the holder (consumer establishing a claim through the card) (Economic and Social Committee of the European Union, 2000).
- **European Commission:** A monetary value stored on an electronic medium, such as a smart card or computer memory, accepted as a means of payment by undertakings other than the issuing institution. It is issued to serve as an electronic substitute for banknotes and coins for limited-value payments (European Commission, 1998).

2.2 Key Characteristics of Electronic Money

Based on the established definitions, electronic money exhibits the following core characteristics:

- **Monetary Value Representation:** E-money represents explicit financial units (e.g., 100 Dinars or 1,000 Dollars). Pre-paid telephone calling cards or food vouchers do not constitute e-money because their stored value reflects specific service units or in-kind claims rather than general purchasing power (Al-Shafei, 2003; Barham, 2010).
- **Electronic Storage Medium:** Monetary value is loaded electronically onto a plastic microchip card or a personal computer hard drive, distinguishing it from conventional minted or printed legal tender. These instruments are purchased prepaid from issuing institutions, hence termed prepaid cards (Bakr, 2007).
- **Independence from Bank Accounts:** Unlike debit or credit cards—which directly access underlying bank deposit accounts—e-money value can reside on the device itself without requiring active commercial bank account balances for transaction execution (Al-Mousawi & Al-Shammari, 2014; Taher, 2012). In this respect, e-money resembles traveler's checks (Attiya, 2006).
- **Broad Acceptability:** To qualify as e-money, the instrument must be widely accepted by entities other than the issuer, establishing public trust as a general medium of exchange. Unlike traditional legal tender issued exclusively by central banks, e-money may be issued by non-bank financial firms and private corporations (Ibrahim, 2008; Mansour, 2006).
- **Multi-Purpose Payment Functionality:** E-money must serve general debt settlement functions, including purchasing goods, obtaining services, and paying tax liabilities, distinguishing it from single-purpose electronic cards (Al-Juhani, 2010).

2.3 Types of Electronic Money

- **Electronic Stored-Value Systems / Digital Wallets:** Balances allocated within physical hardware (smart card memory) or software wallets managed on computer systems. Payment occurs via specialized electronic payment software linking the customer, seller, and issuing institution (Zain El-Din, 2003).
- **Prepaid Magnetic & Smart Cards:** Plastic magnetic-stripe or chip cards issued by banks (e.g., Visa, MasterCard, American Express) loaded with prepaid value. They are usable at Point of Sale (POS) terminals or online. Pure software-based systems (e.g., E-Cash) allow value transfers via encrypted internet attachments (Zain El-Din, 2003).

- **Electronic Credit Money (E-Cash):** Also known as tokenized or value-based electronic cash, representing certified currency values recorded electronically (Al-Mousawi & Al-Shammari, 2014; Zain El-Din, 2003). It operates through credit lines extended by banks, enabling peer-to-peer settlement without intermediary intervention (Mansour, 2006; Al-Jneibi & Al-Jneibi, 2006).
- **Software-Based Smart Money:** Smart cards or software installed on personal computers incorporating microchips (capable of storing 500,000 times the data of magnetic cards), offering robust security against fraud (Al-Mousawi & Al-Shammari, 2014).
- **Electronic Checks (E-Checks):** Digitally signed, secure electronic documents containing check number, payer account details, bank identifier, payee name, amount, currency, and validity date (Zain El-Din, 2003; Mansour, 2006). They eliminate hand-written signature requirements while maintaining legal validity (Al-Amri, 2003).

3. Conceptual Framework of Virtual Money (Bitcoin as a Model)

3.1 Definition of Virtual Currency

Virtual currency encompasses a set of technological concepts and cryptographic protocols forming a digital financial ecosystem, with units commonly designated as Bitcoin (BTC), used for storing and transferring value across peer-to-peer networks (Abu Ghuddah, 2018). Virtual money is characterized as a decentralized digital currency, meaning:

- It lacks a central backing entity, corporate authority, or central bank control.
- It is unbacked by physical commodities or precious metals.
- It operates via open-source algorithmic protocols and software code.
- It is inherently stateless, unconstrained by national jurisdictions or geographical borders.

3.2 Core Characteristics of Virtual Currencies

- Intangible and digital, traded directly across the internet or via digital exchange platforms.
- Stored in digital cryptographic wallets rather than physical drawers or commercial bank deposit vaults.
- Transferred electronically peer-to-peer without centralized intermediary verification.
- Lacks universal legal tender status; acceptance remains voluntary among market participants.
- Exhibits high price volatility and lacks intrinsic value stability, leading to speculative activity.

Initially introduced in 2009 (with widespread economic literature citing 2012 development milestones), virtual currencies have expanded beyond Bitcoin to encompass thousands of alternative coins (e.g., Ripple, Litecoin). Unlike fiat currencies, virtual currencies lack compulsory legal tender status, and their long-term institutional trajectory remains subject to regulatory uncertainty (Abu Ghuddah, 2018).

3.3 Drivers of Virtual Currency Proliferation

- Elimination of financial intermediaries, enabling rapid, direct peer-to-peer transaction settlements (Harvey & Tymoigne, 2015).
- Significantly reduced transaction fees compared to traditional credit card processing networks.
- Universal accessibility for any individual possessing a smartphone or internet connection.
- Mitigation of privacy risks associated with traditional online banking networks vulnerable to data breaches (Naughton, 2013).
- Algorithmic cap on total monetary supply (e.g., 21 million BTC limit), protecting against inflationary debasement caused by unconstrained central bank fiat printing.

3.4 Trading Platforms and Ecosystem

Virtual currency trading relies heavily on web-based cryptocurrency exchange platforms (e.g., HitBTC, Coinbase, Kraken, Bitstamp). These platforms connect buyers and sellers, charging transaction fees and offering spot or margin trading services. However, platforms vary considerably in security, fee structures, regulatory compliance, and custodial risk.

3.5 Advantages and Risks of Virtual Currencies

Advantages include immutability against physical counterfeiting, durability, ease of digital storage, and borderless portability.

Conversely, substantial risks include:

- Extreme market volatility and speculative price bubbles (e.g., rapid price fluctuations documented by academic observers like Garrick Hileman).
- Technical and cybersecurity risks, including smart contract bugs, wallet hacking, and exchange collapses.
- Legal and regulatory ambiguities, leaving consumers without legal recourse in cases of fraud or loss.
- Facilitation of tax evasion and illicit financial flows due to pseudo-anonymity.
- Consumer protection risks arising from the absence of deposit insurance or central bank lender-of-last-resort backstops.

3.6 Comparative Analysis: Electronic Money vs. Virtual Money

Table 1: Comparative Framework Between Electronic Money and Virtual Money

Comparison Dimension	Electronic Money (E-Money)	Virtual Money (Bitcoin/Crypto)
Physical / Digital Form	Digital / Electronic representation	Digital / Cryptographic representation
Unit of Account	National fiat currencies (USD, EUR, DZD, etc.)	Native crypto units (BTC, ETH, XRP, etc.)
User Identification	Strict KYC / Identified commercial bank account	Pseudonymous / Anonymous public keys
Issuance Mechanism	Digitally issued against central bank fiat reserve	Algorithmic mining / Cryptographic consensus
Issuing Entity	Central banks, licensed banks, financial firms	Decentralized open-source network / Protocol

4. The Empirical Reality of Electronic and Virtual Money Globally

Transitioning toward a cashless society relies on digital payment infrastructure, including contactless credit cards, mobile wallet applications (e.g., Apple Pay), and instant electronic bank transfers. Proponents argue that cashless transactions reduce physical robbery, curb illicit cash-based economies, lower currency printing costs, and streamline tax compliance. Conversely, critics express concern over data privacy erosion, systemic technical glitches, and the financial exclusion of unbanked population segments.

4.1 Global Ranking of Cashless Economies

Comparative international studies evaluating debit/credit card penetration, non-cash transaction growth, and mobile payment adoption highlight significant structural divergence among major economies:

- **1.** Canada: Leads globally in cashless readiness, characterized by high per-capita credit card ownership.
- **2.** Sweden: Ranks second, with non-cash transactions accounting for nearly 60% of consumer payments.
- **3.** United Kingdom: Ranks third (47% electronic payment awareness), followed closely by France (39% contactless adoption).
- **4.** United States & China: The US ranks fifth in card volume, while China leads globally in digital mobile payment growth (QR code ecosystems via WeChat Pay and Alipay).
- **5.** Australia & Germany: Australia utilizes instant payment platforms, whereas Germany maintains a 30% non-cash share, reflecting persistent cultural preferences for physical cash.

4.2 Institutional Case Studies: Sweden, China, and Japan

- **The Swedish Cashless Model:** Sweden represents the premier European model of cashless transition. Over 900 of the nation's 1,600 commercial bank branches no longer handle physical cash. The mobile application 'Swish' is utilized by over half the population. Historical policy shifts dating back to the 1960s and early 1990s fee structures on paper checks accelerated card usage to three times the European average.
- **The Chinese QR Ecosystem:** China bypassed credit card reliance, transitioning directly from cash to QR-code mobile payments (WeChat Pay and Alipay). Digital payments have achieved universal integration across public transport, retail commerce, and even micro-donations.
- **The Japanese Cash Paradox:** Despite early technological pioneering (e.g., Sony FeliCa chip integration in 2000 and mobile wallets in 2004), Japan remains heavily reliant on physical cash. Non-cash payments represented only ~24% of personal consumption in 2018, below global averages (~40%). Structural barriers

include phone portability limitations and recharge availability. The Japanese government initiated targeted policy measures to boost non-cash payments to 40% ahead of major international events.

4.3 Empirical Trajectory of Virtual Money (Bitcoin)

Virtual currency markets have demonstrated rapid expansion alongside extreme price volatility. Empirical data from early development phases show daily transaction volumes scaling to hundreds of thousands of transactions, with market capitalization expanding rapidly. However, the absence of sovereign backing or commodity pegging subjects virtual assets to severe market fluctuations, posing substantial portfolio risks.

5. Monetary, Economic, and Financial Implications on Global Economies

5.1 Implications of Electronic Money

5.1.1 Monetary Policy Implications

- **Impact on Interest Rate Transmission:** When individuals convert bank deposits into e-money, commercial bank reserves increase, prompting banks to expand lending or purchase securities. If private e-money issuers generate unconstrained digital credit, central bank control over benchmark short-term interest rates becomes distorted (Al-Shafei, 2003).
- **Impact on Open Market Operations:** As public demand for central bank physical liquidity declines, commercial banks reduce excess reserve holdings. This contracts the central bank's balance sheet, diminishing its ability to conduct open market operations effectively to regulate credit availability (Al-Shafei, 2003).
- **Impact on Reserve Requirements:** Displacement of legal tender forces central banks to lower mandatory reserve requirements and expand eligible collateral assets to support commercial liquidity.

5.1.2 Macroeconomic Implications

- **Consumption Dynamics:** Reduced transaction costs for online services (e.g., software, digital media) stimulate private consumption expenditure.
- **Investment and Employment:** Drives capital investment into electronic equipment, software engineering, and financial technology infrastructure. While generating specialized IT employment, automated digital payments reduce traditional banking branch administrative jobs.
- **Exchange Rate Volatility:** Facilitates low-cost cross-border currency conversion, encouraging speculative trading in digital foreign exchange markets and increasing exchange rate volatility.
- **Inflationary Pressures:** Unregulated e-money creation by non-bank private entities risks expanding aggregate money supply beyond economic output, exacerbating inflationary pressures.

5.1.3 Fiscal and Public Finance Implications

- **Loss of Seigniorage Revenue:** Substitution of central bank currency reduces monetary base liabilities, directly diminishing central bank seigniorage profits remitted to state treasuries (Al-Shafei, 2003).
- **Tax Administration Challenges:** Encrypted electronic transactions complicate tax audit trails, increasing tax evasion risks unless revenue authorities gain access to digital accounting databases.

5.2 Implications of Virtual Currencies

5.2.1 Monetary Policy and Central Bank Authority

Because virtual currencies currently represent a small fraction of aggregate global money supply (M2), their baseline monetary policy impact remains bounded (Abdel Hamid, 2019). Central bank response scenarios fall into three institutional frameworks:

- **Indirect Integration:** Scenario 1: Central banks incorporate virtual assets into broad money supply measures (M2), adjusting policy tools indirectly.
- **Formal Regulatory Framework:** Scenario 2: Institutional regulation and international coordination integrate digital assets into formal financial frameworks.
- **Monetary Fragmentation:** Scenario 3 (Pessimistic): Uncontrolled proliferation leads to monetary fragmentation, eroding central bank sovereignty over national monetary policy.

5.2.2 Economic and Financial Market Impacts

- **Payment System & Exchange Rate Instability:** Extreme price swings in unbacked digital assets introduce systemic volatility into broader financial markets.

- **Divergence Between Real and Financial Economies:** Divergence between speculative financial trading in crypto-assets and tangible economic output threatens macroeconomic stability.
- **International Trade and Disintermediation:** Facilitates direct peer-to-peer settlement networks (e.g., Ripple XRP interbank settlements), reducing cross-border clearing costs while disintermediating conventional commercial bank credit channels (Abdel Hamid, 2019; Al-Bahooth, 2017).

6. Conclusion and Strategic Recommendations

This study demonstrates that electronic and virtual currencies represent an irreversible evolution in the global monetary system. While offering unprecedented transactional efficiency and lower cost structures, they introduce significant regulatory, monetary, and fiscal challenges.

6.1 Core Findings

- E-money and virtual currencies have established operational roles as exchange mediums, units of account, and speculative stores of value.
- Central bank control over interest rates, open market operations, and seigniorage revenue faces structural erosion without modern regulatory intervention.
- Developing economies, particularly Algeria, face structural delays in adopting digital money systems due to technical infrastructure deficits, legal ambiguities, and financial sector rigidity.

6.2 Strategic Recommendations

- Develop modern national banking payment infrastructure capable of supporting secure digital fund transfers.
- Establish robust comprehensive legal frameworks governing digital money issuance, licensing, consumer protection, and tax compliance.
- Place digital currency issuance under explicit central bank oversight to maintain authority over national aggregate money supply.
- Invest in technical training for banking personnel to manage digital payment risks, cybersecurity threats, and operational disruptions.
- Formulate an adaptive monetary policy framework in developing nations like Algeria to harness digital payment benefits while mitigating financial stability risks.

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