How is Financial Technology Changing Regulation and Supervision

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Financial Supervision and Regulation Division
Monetary & Capital Markets Department
Agenda

- Overview of FinTech Developments
- Key Challenges of Regulators
- Solutions
  - Regulatory Sandbox
  - Regtech and Suptech
- Case Study - Crypto-Assets
  - Market Characteristics
  - Risk Analysis
  - Regulatory Approaches / Competition
Emerging Markets have been more advanced

Source: EY FinTech Adoption Index 2017
Emerging Markets are moving faster

Source: “Payments are a-changin’ but cash still rules”, by M. Bech, U. Faruqui, F. Ougaard and C. Picillo, BIS, Mar 2018

*2009-16

Economist.com
## Top Five Markets

<table>
<thead>
<tr>
<th></th>
<th>Money transfer and payments</th>
<th>Financial planning</th>
<th>Savings and investments</th>
<th>Borrowing</th>
<th>Insurance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>China 83%</td>
<td>China 22%</td>
<td>China 58%</td>
<td>China 46%</td>
<td>India 47%</td>
</tr>
<tr>
<td>2</td>
<td>India 72%</td>
<td>Brazil 21%</td>
<td>India 39%</td>
<td>India 20%</td>
<td>UK 43%</td>
</tr>
<tr>
<td>3</td>
<td>Brazil 60%</td>
<td>India 20%</td>
<td>Brazil 29%</td>
<td>Brazil 15%</td>
<td>China 38%</td>
</tr>
<tr>
<td>4</td>
<td>Australia 59%</td>
<td>US 15%</td>
<td>US 27%</td>
<td>US 13%</td>
<td>South Africa 32%</td>
</tr>
<tr>
<td>5</td>
<td>UK 57%</td>
<td>Hong Kong 13%</td>
<td>Hong Kong 25%</td>
<td>Germany 12%</td>
<td>Germany 31%</td>
</tr>
</tbody>
</table>

Source: EY FinTech Adoption Index 2017
## Landscape of FinTech

<table>
<thead>
<tr>
<th>New Services</th>
<th>Main Industry</th>
<th>Key Authority / Regulator</th>
<th>Potential Benefit</th>
<th>Financial Stability Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Robo-Adviser</td>
<td>Asset Managers</td>
<td>Security Regulator</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Peer-to-Peer Lending / Credit Scoring</td>
<td>Banks and finance companies</td>
<td>Banking Regulator / Central Bank</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Cloud Data Service</td>
<td>Banks and other financial entities</td>
<td>Banking Regulator (Indirect)</td>
<td>M</td>
<td>M</td>
</tr>
<tr>
<td>Insurtech</td>
<td>Insurers and Insurance Intermediaries</td>
<td>Insurance Regulator</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td>Regtech / Suptech</td>
<td>Banks and Broker Dealers</td>
<td>AML CFT Authority / Bank Regulator / Security Regulator</td>
<td>H</td>
<td>L</td>
</tr>
<tr>
<td>Crypto-Assets</td>
<td>New players (Issuers, Exchanges, Wallet Providers, Miners)</td>
<td>Central Bank, Securities Regulator or New Regulator?</td>
<td>H or zero?</td>
<td>H ?</td>
</tr>
</tbody>
</table>
Regulatory Challenges

- Can financial regulators expand the scope of entities or shift to activities base?
- Are supervision and enforcement effective through such approach?
- Is existing regulatory cooperation effective enough?
- Would supervisors be facing more competitive pressure?
- Can regulators continue to attract and retain skilled staff?
- Can Supervisors access to good information to monitor industry development?
- Can regulators keep up with the development?
- Can regulators understand new risk and take prompt actions?
## Regulatory Sandbox

<table>
<thead>
<tr>
<th>Country</th>
<th>Regulator</th>
<th>Type of Applicant</th>
<th>Benefits for Businesses</th>
<th>Safeguards</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Authorized/Licensed/Incumbents</td>
<td>Unauthorized/Unlicensed/Startups</td>
<td>Regulations relaxed or waived</td>
</tr>
<tr>
<td>Australia</td>
<td>ASIC</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Canada</td>
<td>CSA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hong Kong SAR</td>
<td>HKMA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Malaysia</td>
<td>BNM</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Singapore</td>
<td>MAS</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Switzerland</td>
<td>FDF</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>ADGM</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>FCA</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

Explicitly mentioned in the regulatory authority’s disclosure, staff analysis.

Either not required or not mentioned in the regulatory authority’s disclosure.

### Purposes:
- Support and facilitate innovation (or at least reduce roadblocks).
- Give innovators time to test ideas in actual markets without risking regulatory enforcement actions.
- Give regulators timely and accurate information about new activities and developments.

**Bonus:** gives regulators opportunity to reexamine reasons for some rules.

*Source: IMF Staff Discussion Note, 2017, Fintech and Financial Services*
Regtech and Suptech

**Regtech**

- Applications of FinTech for regulatory requirements
- Main area of applications
  1. KYC process for AML/CFT
  2. Risk management, such as risk data aggregation
  3. Regulatory reporting, such as those of derivative transactions

**Suptech**

- Applications of FinTech by supervisors
- Examples
  1. Market surveillance
  2. Validation of reporting data
  3. Chatbots
  4. Machine-readable regulations
What is Crypto-Assets

Bech and Garratt (2017)
Rapid Growth with High Volatility

Closing price and market capitalisation

<table>
<thead>
<tr>
<th>Year</th>
<th>USD ‘000s</th>
<th>USD bn</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>16</td>
<td>0</td>
</tr>
<tr>
<td>2017</td>
<td>12</td>
<td>150</td>
</tr>
<tr>
<td>2018</td>
<td>8</td>
<td>450</td>
</tr>
</tbody>
</table>

Price volatility

<table>
<thead>
<tr>
<th>Year</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>200</td>
</tr>
<tr>
<td>2017</td>
<td>160</td>
</tr>
<tr>
<td>2018</td>
<td>120</td>
</tr>
</tbody>
</table>

1 90-day moving standard deviation of daily returns.

Source: Report to the G20, FSB, July 2018
Are Crypto Assets Currencies?

Medium of Exchange
• Crypto assets are not widely accepted in any market.
• Payment transactions in crypto assets are often slower and more expensive than conventional electronic transfers of funds.

Store of Value
• Price fluctuates too much for this purpose.
• Bitcoin reached a high of almost USD 20,000 and then lost 2/3 of its value in a month. Does not inspire confidence as a store of value.

Unit of Account
• How many entities maintain their financial accounts in Cryptos?
Transaction Costs - Bitcoin

Source: bitinfocharts.com
Investors’ Location?

Currency pairs’ trading volumes with BTC

Source: FSB
High Risk of Regulatory Arbitrages

Source: CoinMarketCap.com, Morgan Stanley Research
High Concentration

Trading volume is highly concentrated, with 80 percent of volume traded on just 14 exchanges.

97% of all bitcoins are held by 4% of addresses.

Source: Credit Suisse, blockchain.info
Linkage to Financial Sector

- Direct exposure seems limited
- Indirect exposure could grow rapidly through
  1. Derivatives, P/E investment
  2. Crypto asset exchanges
  3. Loans to leveraged crypto-investors
  4. Reputational channel

- Most authorities (even those of Advanced Jurisdictions) don’t have any official reporting framework
- Some financial regulators might be under political pressure to adopt technology-friendly framework.
- Most countries don’t have a clear responsible authority.
Linkage through Derivatives

- Some exchanges (CBOE and CME) provide Crypto-linked derivatives
- US Investment Bankers had expressed their concern of potential contagion risk
- Investment banks seem to be carefully selecting investors, monitoring and imposing counterparty limits
- Conservative margin is required, which effectively limits the leverage up to 2 times.

Source: Morgan Stanley Research, June 2018
ICO is becoming important funding source

- Initial Coin Offering (ICO) creates digital tokens and sell to investors in return for a crypto asset.
- Often structured to avoid clear categories of securities, such as debt / equities instruments.
- Case law sets four criteria:
  1. Investment of money
  2. In common enterprise
  3. With expectation of profit
  4. Primarily from others’ efforts

Source: Autonomous NEXT
High Risk Investment

2017 ICOs by Status

- Failed since ICO: 32%
- Active ICOs: 36%
- Failed at Funding: 32%

ICO vs. Startups

- Fail within the first year:
  - Startups: 25%
  - ICOs*: 64%

- Fail over 10-yr period:
  - Startups: 71%-75%
  - ?

Source: DigRate, Morgan Stanley Research, June 2018
ICO is still booming but disappointing performance

Source: icowatchlist.com

Average Monthly Return of Initial Coin Offerings Investments

Source: fintechnews.hk
Stock Exchange vs Crypto Exchange

**Stock Exchange**

Buyers
- A – $X
- B – $Y
- C – $Z

Sellers
- D – $X
- E – $Y
- F – $Z

**Crypto Exchange**

Buyer
- A – $X

Inventory

Seller
- B – $X
High Cyber Risk

Bitcoinica was exposed to hacker attacks through the hosting site vulnerability. The funds were stolen and the exchange was closed.

The hacker could access the backup key storage of the exchange purse. The exchange was closed and funds partly returned to users.

The exchange suspended trading, closed its website and exchange service, and filed for bankruptcy protection from creditors. Users did not receive compensation. Hack attempts were also made in 2012.

Bitstamp was hacked through phishing. As a result, the trading platform was completely reorganized. Losses were covered from reserve funds.

The exchange did not use "cold storage." The exchange issued Bitfinex tokens (BFX) for users who lost their funds.

Attackers compromised the employees' computers. Partial compensation was paid to users.

Funds stolen in BTC

<table>
<thead>
<tr>
<th>Exchange</th>
<th>Amount</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bitfloor</td>
<td>25,000 BTC</td>
<td>September 2012</td>
</tr>
<tr>
<td>Bitcoinica</td>
<td>43,000 BTC</td>
<td>March 2012</td>
</tr>
<tr>
<td>Mt. Gox</td>
<td>850,000 BTC</td>
<td>February 2014</td>
</tr>
<tr>
<td>Bitstamp</td>
<td>19,000 BTC</td>
<td>January 2016</td>
</tr>
<tr>
<td>Bitfinex</td>
<td>119,456 BTC</td>
<td>August 2016</td>
</tr>
<tr>
<td>Bithumb</td>
<td>420 BTC</td>
<td>July 2017</td>
</tr>
</tbody>
</table>

Source: EY analysis, Group-IB based on Securitylab, Vedomosti, Insider, company websites
## Fragmented Regulatory Approaches

<table>
<thead>
<tr>
<th>Option</th>
<th>Prohibit</th>
<th>Regulate</th>
<th>Monitor</th>
<th>Ignore</th>
</tr>
</thead>
</table>

### In the case of crypto assets...

<table>
<thead>
<tr>
<th>Example*</th>
<th>China, India, Indonesia, Russia</th>
<th>NY State (2015-)</th>
<th>Japan (2017-)</th>
<th>EU (2018-)</th>
<th>FSB (2018-)</th>
<th>Many?</th>
</tr>
</thead>
</table>

### Pros

- **No harm caused by regulated entities.**
- **Better monitoring.**
- Can be on top of the development without taking regulatory responsibility.
- Can avoid being interpreted as endorsement.

### Cons

- Cross-border and underground activities may not be contained. May stifle innovation.
- May be misinterpreted as endorsement. Cannot avoid being criticized as either too much or too little.
- Need to rely on informally gathered statistics. Cannot contain problems.
- May not notice growing problems.

*Prohibition, regulation and monitoring refer only to certain scope of businesses or activities related to crypto-assets. For more specific descriptions, please refer to FATF, “FATF Report to G20 Finance Ministers and Central Bank Governance,” July 2018.

*Source: FSA Japan*
Regulatory Competition

Prime Minister – “Welcome to #Malta @binance. We aim to be the global trailblazers in the regulation of blockchain-based businesses and the jurisdiction of quality and choice for world class fintech companies”

Minister for Commerce – “delivered the world’s first DLT Regulatory Framework in January 2018” “it is important that Government continues to invest in supporting the development of knowledge and skills”

Premier - “Small ships can turn quickly. That's the beauty of Bermuda” “We believe over the last nine months that our government has shown that not only are we open for business, but we mean business.”
Thank you for your attention!
Supplemental Slides
Driven by Global / Retail / Young Investors

Source: Bitcoin.com (July 2016)
Distribution of Bitcoin Mining Pools

Source: IMF staff illustration (blockchain.com data, August 2018)
**Mining**

Searching for a solution to a difficult mathematical problem

Takes a lot of computing power

Only trial-and-error methods work

It easy to verify that a solution is correct

A new block can be created when a solution is found

Miners compete to find a solution (first to succeed takes all rewards)
Wallet

PAPER WALLET (COLD)

1A5GqrNbp07xwpt1VQVvcA5yzoEcgafvff

KxSRZnttMtVhe17S5FhPqWpKAEgMT9T3R6Eferj3sx5frM6obqA

RECEIVE BITCOIN TELLING THIS ADDRESS TO THE PAYER

SPEND BITCOIN SIGNING THE PAYMENT TRANSACTION WITH THIS KEY

Wallets do not store coins. They store addresses (public keys) and private keys.
Wallet (2)

Software wallet (hot)

Dedicated hardware wallet (hot/cold)

Generic hardware wallet (hot/cold)
# Some Key Considerations

<table>
<thead>
<tr>
<th><strong>Promise of Fintech</strong></th>
<th><strong>Competition</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Reaping the benefits (financial inclusions, etc.) requires preparation (institutional capacity, outreach to stakeholders, cross agency cooperation)</td>
<td>Open, free and contestable markets for level playing field. Foster standardization, interoperability and access to key infrastructures.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Monitoring</strong></th>
<th><strong>Regulation</strong></th>
<th><strong>Infrastructure</strong></th>
<th><strong>International Cooperation</strong></th>
</tr>
</thead>
</table>