The Dark Side of Digital Financial Transformation: Cybersecurity and Technological Risk

Douglas W. Arner
Kerry Holdings Professor in Law
University of Hong Kong
Douglas.Arner@hku.hk
FinTech Evolution and Typology
The Evolution of FinTech:


1. 1866 - 1967
   - Infrastructure
     - Developing World
       - Telegraph
     - Developed World
       - Teleph
2. 1968 - 2008
   - Banks
     - ATM
3. 2007 - 2009 - Current
   - Start-ups
     - Reaction
     - Reform
     - P2P
     - Credit Scoring
     - Identity
     - Big Data
     - AI
     - IoT
     - Decentralized
4. 2018 - Future
   - BaaS
Mobile vs Banking Penetration

Within developing parts of Asia, mobile phone ownership is more wide-spread than Bank account registration:

**China**
- Population: 1.35bn
- Formally Banked: 63%
- Mobile Phone: 89%

**India**
- Population: 1.25bn
- Formally Banked: 35%
- Mobile Phone: 71%

**Malaysia**
- Population: 29.7m
- Formally Banked: 66%
- Mobile Phone: 131%

**Australia**
- Population: 23.1m
- Formally Banked: 99%
- Mobile Phone: 107%

**South Korea**
- Population: 50.2m
- Formally Banked: 93%
- Mobile Phone: 111%

**Japan**
- Population: 127.3m
- Formally Banked: 96%
- Mobile Phone: 115%

**Vietnam**
- Population: 89.7m
- Formally Banked: 21%
- Mobile Phone: 131%

**New Zealand**
- Population: 4.47m
- Formally Banked: 99%
- Mobile Phone: 106%
Implications

Main current concerns of policymakers and industry arise not from the technology itself but from the question of who is applying technology to finance along with the speed of development.

An evolutionary approach to create a framework of understanding is necessary to understand the implications for established financial institutions, IT companies, start-ups and regulators alike.
Regulatory challenges

New emerging FinTech companies often have limited track records regarding their business (e.g., risk management, liquidity and profitability) and difficulty identifying their obligations (e.g., applicable regulations or licences).

For regulators, these early-stage companies represent a limited prudential & consumer risk. However, exponential company growth can create “risk blind spots”. Additionally, frequent failures or fraud can impact market or investor confidence.

[Diagram showing the concepts of Too Small to Care, Too Large to Ignore, and Too Big to Fail with Tacit acceptance and Licensing obligation as nodes.]
RegTech and the Reconceptualisation of Regulation

RegTech digital disruption is not just about greater efficiency in existing processes but new processes altogether.

RegTech and the Reconceptualization of Regulation
SSRN: http://ssrn.com/abstract=2847806
RegTech encompasses industry and regulators

<table>
<thead>
<tr>
<th>Financial institutions and industry</th>
<th>Regulators</th>
<th>Start-ups</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Major drivers of RegTech development</td>
<td>• Lag in regulator adoption relative to private sector</td>
<td>• Incentives to trade off-data for faster market entry</td>
</tr>
<tr>
<td>• Demand efficient tools to deal with regulatory and compliance demands</td>
<td>• Yet need to develop systems to deal with rivers of new data and cybersecurity</td>
<td>• Automation of reporting and compliance more aligned with lean business model</td>
</tr>
<tr>
<td>• Global firms developing centralized risk management</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
RegTech+ : Smart Regulation

Information and monitoring – FSB (2017)
Systems design
Digitisation
Datification
Designing a framework for digital financial transformation

- Objectives: financial inclusion, economic growth, financial stability, market integrity
- Pillar I: Empowering Access Digital ID / eKYC / simplified account opening
- Pillar II: Enabling use: Digital payments infrastructure and open electronic payments systems
- Pillar III: Scaling use – digitisation of government payments and provision of services
- Pillar IV: Expanding the quality and range of services: Designing financial systems and structures
**India Stack**

**VISION**

- **Presence-Less**
  Unique digital biometric identity

- **Paper-Less**
  Electronic documentation protected by digital signature and storage

- **Cash-Less**
  Single interface to all interconnected payments platform

- **Consent**
  Consent-enabled data sharing framework

**IMPACT**

1,000% Efficiency Gain for end-to-end account creation

<table>
<thead>
<tr>
<th></th>
<th>Bank</th>
<th>Prepaid Card Issuer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>14- 30 days</td>
<td>1 – 2 days</td>
</tr>
<tr>
<td>Time</td>
<td>70 – 91 min</td>
<td>6 – 20 min</td>
</tr>
<tr>
<td>Costs (USD)</td>
<td>US$ 5.2 – 8.7</td>
<td>US$ 0.34 – 1.6</td>
</tr>
</tbody>
</table>

Re-aligns economic viability of financial inclusion delivery
Pillar I: Empowering Access Digital ID / eKYC / simplified account opening

- Base ID
- KYC
- Suitability?

- Local / foreign / non-physically present
- Individual / corporate

- Challenges: domestic context, security

- Structures: Sovereign / Monopoly / Open
Pillar II:
Enabling use: Digital payments infrastructure and open electronic payments systems

• Traditional
• New entrants / technologies
• Regulation
• Related benefits: ecommerce, empowerment / entrepreneurship
Pillar III: Scaling use – digitisation of government payments and provision of services

- Pillar I / II
- Strategy: access + savings + efficiencies
- Government salaries / benefits / pensions
- Requirement?

- Related benefits: leakage / taxation / formalisation / market integrity
Pillar IV: Expanding the quality and range of services: Designing financial systems and structures

- Pillar I, II, III: Payments, transactions, savings
- Infrastructure for traditional and non-traditional access to finance
- Credit: credit analysis, cashflow (SMEs)
- Investment: clearing / settlement / trading, national pensions, debt markets, equity markets, roboadvisory
- Insurance
- Early stage and other financing: building better systems?
Designing markets and systems

- Clearing / settlement
- Registration / ownership
- Trade / finance
- Data storage / transfer / protection
- Finance
Case study: EU Big Bang II

- PSD 2: Payment Services Directive 2 – open API banking
- MiFID 2: Markets in Financial Instruments Directive 2 – transparency across markets
- GDPR: General Data Protection Regulation
Blockchain: DLT + cryptography + smart contracts

- Centralised / networked / distributed
- Permissioned / permissionless
- Trust solution: security / transparency / permanence

Distributed Ledger Technology and Distributed Liability:
Looking Forward

• Cybersecurity risks
• Technological risks
• Data security / protection
• Interoperability / connectivity
• TechFin
• International / regional cooperation
Cybersecurity

- Bangladesh
- Equifax
- Aadhar
- EDGAR
- Facebook
- ... 
- Startups, incumbents, TechFins, infrastructure, regulators ...
- Data storage: centralisation, decentralisation, segregation...
Hostile and other actors

- Participants
  - Hackers
  - Hacktivists
  - Terrorists
  - Criminals: of all types
  - Corporations
  - Sovereign / quasi sovereign

- Purposes
  - Fun
  - Destruction
  - Message
  - Theft: old and new
  - Warfare
Risk areas

- Cyber: number 1 national security, public security AND financial stability risk
- Incumbents
- Infrastructure: old and new
- New entrants: small and large
- Regulators / governments
- Markets: Flashcrash ...
What to do?

• Financial sector: risk management systems, data protection systems, contingency planning, insurance
• Regulators: monitoring, supervisory review, information sharing, sandboxes / stress tests / war games / contingency plans, capital
• Governments: training / human capital, defense / planning
• International / regional cooperation / information sharing
TechFin

- Network effects
- Competition
- Regulation
- Non-traditional infrastructure
Being “technologically neutral” has lead regulators to distance themselves from the necessity to understand new technological innovation.

Creates a knowledge gap in the consequences in the use of new processes & algorithms

FICO Score => Regulated
Alternative Credit Score => Unregulated

Risk mispricing of credit or loan origination
FinTech Evolution
https://ssrn.com/abstract=2676553

RegTech
https://ssrn.com/abstract=2847806

TechFin
https://ssrn.com/abstract=2959925

Sandboxes
https://ssrn.com/abstract=3018534

DFS in China
http://ssrn.com/abstract=2660050

DLT liability
https://ssrn.com/abstract=3018214
The first massive open online FinTech course

https://www.edx.org/course/introduction-to-fintech