Cyber Security and Financial Stability

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bostonfed.org
Central Banks and Payments

- Safety, security, and efficiency of payment systems is an important role for central banks.
- Payment system innovation has generated a less bank-centric system that is evolving faster than the regulatory framework.
- I will discuss today why financial stability and cyber security of payments are so closely linked.
Impact of Innovations in Payments

- Lower costs and more flexible payments options for consumers and businesses
- However, cyber-security issues are beginning to intrude on the benefits of some of these innovations
- From the inconvenience of denial of transaction to more serious identity theft, households are being affected
- Firms are also impacted by collateral problems with electronic payments – resulting in a wide variety of proprietary information being misappropriated
Financially Motivated Cyber Threats

- Traditional purpose of attack – financial gain
- Strategies to contain attacks focused on financial gain:
  - First, prevent the intruder from entering the system
  - Second, and often more importantly, prevent the intruder’s ability to leave the system with confidential data
  - Third, devalue the data so it is meaningless to an intruder
Rogue States and Cyber Security

- Different purpose of attack – causing disruption of payments and economic activity is the goal

- These attacks have become much more disruptive
  - Initially, used brute-force “denial of service”
  - Penetrating and disrupting payments and records is now a greater risk

- This highlights the need for defense-grade security level, not just commercial-grade security level
U.S. Payments Systems

- Federal Reserve Banks process over $4 trillion in transactions per day
- Wholesale payments – for example, Fedwire Funds transfers, Fedwire Securities transactions, and CHIPS
- Retail payments – Automated Clearinghouse (ACH) payments, credit card payments, debit card payments, PayPal, Google Wallet or Apple Pay
Figure 1: Retail Authorization

Third party provider
- Phishing emails
- Compromised data

Issuing bank
- Phishing emails
- Compromised data

Merchant
- Phishing emails
- Compromised data

Customer
- Phishing emails
- Compromised websites

Customer
- $
Figure 2: U.S. Regulatory Authority over Payment, Clearing and Settlement Systems
Implications of Complicated Payments

▶ Advantages
  ▶ Decentralized – difficult to simultaneously shut entire system down
  ▶ Less likely to have a single point of failure

▶ Disadvantages
  ▶ Cyber attacks focus on weakest link
  ▶ Unified cyber-prevention approach difficult to implement
Disruption of Payments on September 11, 2001

- Numerous payments systems impacted
- New York Stock Exchange halted trading for 4 days
- Flow of funds badly disrupted
- Some banks had a large surplus of reserves and others had large deficits
Figure 3: Federal Reserve Loans to Depository Institutions and Commercial Bank Interbank Loans
Weekly, January 3, 2001 - December 26, 2001

Note: Data are weekly as of Wednesdays.
Source: Federal Reserve Board, Haver Analytics
Remediation after September 11

- Within one week most services had been restored
- *Interagency White Paper on Sound Practices to Strengthen the Resilience of the U.S. Financial System*
  - Required expensive back-up capabilities and quick restoration of service
  - Dramatically improved the ability and speed at which payments activities could be restored should a man-made or natural disaster impact operations
- These actions were taken after the problem was apparent
Figure 4: Major Cyber Intrusions Originating from Vendors

<table>
<thead>
<tr>
<th>Comprised Companies</th>
<th>Quantity of Records Compromised</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>40 mil. credit cards, 70 mil. customer records</td>
<td>Stolen HVAC vendor login ID and password</td>
</tr>
<tr>
<td>Home Depot</td>
<td>56 mil. credit cards, 53 mil. email addresses</td>
<td>Stolen HVAC vendor login ID and password</td>
</tr>
<tr>
<td>National Archives &amp; Records Administration</td>
<td>76 mil. veteran records</td>
<td>Computer disk drive sent to 3rd party for destruction</td>
</tr>
<tr>
<td>Goodwill Stores</td>
<td>900 thous. credit cards</td>
<td>3rd party POS vendor</td>
</tr>
</tbody>
</table>

Source: Federal Reserve Bank of Boston, Various News Reports
Cyber Security and Smaller Financial Institutions

- Over 6,000 banks in the U.S., many of them small
- Small banks have limited resources for cyber security
  - No access to national security briefings
  - Often rely on outside vendors or third-party processors
- The least technically advanced entities may provide the easiest access for hackers to the payments system
Federal Reserve Bank of Boston and Cyber Security for Small Banks

- Single-industry focused pilot program
  - Information sharing the key component
  - In-person meetings – everyone signs non-disclosure forms
  - Conducted by cyber-security experts within the Boston Fed who have broader access to details about emerging threats and mitigants that may be available to smaller financial institutions
  - Not part of the supervisory process
- We are expanding the program in 2015
Federal Reserve Payment System Study*

- *Strategies for Improving the U.S. Payment System,* paper issued earlier this week
- The Federal Reserve believes that security is the foundation of any payment system
- The Fed intends to promote end-to-end payments security, and encourage a system that improves continuously in response to evolving threats

* www.FedPayments Improvement.org
Concluding Observations

- Cyber security is a financial stability concern – and the changing nature of threat (less financial gain and more akin to cyber terrorism) poses new challenges
- Central banks need to be proactive
  - Adapt payments system to new threats
  - Consider small as well as large banks
- This is a problem with no boundaries – applies whether you are at the tip of Cape Town or the top of Maine