E-Commerce

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Guest lectures
Anna Soilleux, Olswang
Kush Puri and Tim Phillips, KPMG
Richard Clayton, CL
Aims

Outline

Lectures:
1. What is money and its traded equivalents
2. Networks, regulation and business models
3. Law and Commerce (AS)
4. Web design and implementation
5. Creating a business
6. Finance and funding (KP and TP)
7. Making it work
8. Snoopers charter, RIP, DMCA and others (RC)

Lecture notes for guest lectures (3,6,8) will be provided on the day of the lecture
Online Resources

Andrew Odlyzko: Recent Papers on Technology and Financial Manias

- Financialisation of the early Victorian economy and the London Stock Exchange. A. Odlyzko. (PDF)
- The forgotten story of gravity models and the ineffectiveness of early railway networks. A. Odlyzko. (PDF)
- Supplementary material for “Economically irrational pricing of 19th century British government bonds.” A. Odlyzko. (PDF)
- Crushing national debt, economic revolution, and extraordinary popular delusions. A. Odlyzko. (PDF)
- Or a web-search for other similar lists and pages: http://www.webpagesthatstuck.com
- Or a web-search for other similar lists and pages: http://www.legislation.gov.uk/uksi/2002/2013/contents/made

Andrew Odlyzko’s papers on Technology and Financial Manias

http://www.dtc.umn.edu/~odlyzko/doc/bubbles.html
What is E-commerce?

A course thought up by the Teaching committee…
research on protocols, economics

B2B
Replacement of paper with electronic documents
Re-badged Electronic Document Interchange (EDI)
Electronic Money

B2C Mail order - amazon.com
New business models
Disintermediation
CRM

New opportunities for fraud
The dark web

App economies
Social media

and many more
Remote transaction

1. Please issue LoC: Here is deposit

2. LoC: "Pay bearer after 30 days if you have Bill of lading and Inspection Certificate"

3. Order +LoC

4. Goods

5. Bill of Lading

6. Bill of Lading

7. Bill of Lading

8. Money

Customer

Manufacturer

Shipper

Inspector

Customer's Bank

Correspondent Bank

Trust relationship and mutual accounts
Traded Paper

Typical instruments include
   Warehouse receipts
   Bills of Lading - "The holder is entitled to 100 amphorae of oil from the cargo of the ship Augusta"
   Purchase orders and invoices
   Insurance certificates
   Certificates of debt
   Payment instructions - Bank-to-bank or bank-customer-bank (cheques), letters of credit
   Banknotes
   Bearer certificates - coupons
   Share Certificates

Negotiable / guaranteed - can be used for payment, security, etc.
The invention of the telegraph led to the development of business use protocols

Hugh boom in telegraph construction and applications

Indirect effects included creation of national markets - price differences drove rapid shipment + arbitrage

Direct uses included purchase orders and queries. Easy where there is an existing relationship, otherwise intermediaries needed

Huge expansion in banking

Banks sent about 50% of telegraph traffic

Trusted intermediaries

Others (insurers, inspection agents, shipping agents) largely harnessed via bank mechanisms
B2B - Wiring Money

Interbank message e.g.

“To: Lomarco Bank, Geneva. Please pay SFR 10,000 from our account to Herr Thilo Schmidt on presentation of his passport. Our test key is 254”

The 254 is a primitive MAC computed on significant data (money, date, currency, etc)

SWIFT reimplemented this using ‘email’ and proper MAC in mid 70’s

First big ‘open’ EDI system

Swift II added PKI to manage MAC keys in early 1990’s

Adapted to CREST (UK equity clearing)

Commercial transactions similar, but more complex conditions

e.g. LoC needs Bill of Lading, insurance certificate and inspection certificate
Electronic Document Interchange (EDI)

Proprietary systems build late 60s / early 70s

- General Motors ordering car components (EDS)
- Marks and Spencer’s clothes ordering

Big problem not security or DoS or lost systems but standards

- 1980s agreeing common message formats
  UN, specific country / industry e.g. NHS

- Being redone as XML
  e.g. BOLERO (www.bolero.net)

- Many players - slow progress
What is money

Exchange of value
Store of value
Measure of value

Fiat money

Money issued by the Government, can't go bust, can always print more
- may cause inflation, exchange rate drop etc
- "cash is trash"

“Unforgable” bearer certificates

Anonymous, immediate

Trusted (mostly)
Business-to-business communications go back into antiquity

Believed to have driven the invention of writing and mathematics

Trust system
Financial Instability Hypothesis

Hyman Minsky (1919-1996)

Accumulation of debt causes instability

Three stages
- **Hedge borrower** - can repay interest and capital
- **Speculative borrower** - can only repay interest = hopes asset will go up
- **Ponzi borrower** - hopes appreciation of asset will pay both interest and capital

Good times don’t last

https://en.wikipedia.org/wiki/Hyman_Minsky
https://kpfa.org/wp-content/uploads/2016/06/HymanMinsky2.png
Macro economics: Modern Monetary Theory

Domestic Government Balance + Domestic Private Balance + Foreign Balance = 0

(T-G) + (S - I) - NX = 0

Where
G is government spending
T is taxes
S is savings
I is investment
NX is net exports

or
S-I = G-T + NX

=> Private Wealth ~ Government deficit or trade surplus

http://neweconomicperspectives.org/modern-monetary-theory-primer.html
Bearer certificates

Token representing value

May be anonymous (cash vs cheque)

Not easily forger (trust)

Physical handling (banks / wallets)

Coupons

Tradeable (bureau de change)
Electronic Bearer Certificates

Centralised
  e.g. Paypal, Oyster card, M-Pesa

Decentralised
  e.g. Bitcoin
    Exchange of value ✔
    Store of value  X
    Measure of value X

Hard (repudiatable) vs Soft (no recourse)

http://www.xe.com/currencycharts/?from=GBP&to=XBT
Electronic money

Unforgeable token
e.g. (value, serial number, id) signed by the issuer’s private key

Problem: how to avoid double spending?
Store all spent tokens - can retire blocks of used tokens
Store all unspent tokens
Central store
Distributed store - bitcoin block chain
Electronic money - 2

Trusted

Value?

Volatility?

Anonymous or pseudo-anonymous or open?

Currency?
   Fiat, or other asset backed
Magic of banking

Not everyone will want to withdraw at the same time
Confidence

Banks need only fund difference between deposits and loans

Reserve ratios vary over time, between countries and size of deposit taking institution

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https://en.wikipedia.org/wiki/Reserve_requirement, 5/1/2027
Game money

Monetisation for F2P apps

Multiple currencies gives easier control

Hard/soft currencies
“Buy this sword for £9.99 or 10,000 gems”

Multiple traceable game objects
Wood, good, gems, credits, etc

Internal market

External market

Game money - 2

Fungible or purchase / winnable only?
+ prevention of “Mudflation”, 3rd party exchanges
- money laundering regulation, VAT, gambling etc

Economic Stability
Sources and sinks
Central banker(s)
Other financial products
Pseudo anonymous?

Second Life Closes Banks
After months of financial scandals and fraud allegations, virtual banks got an eviction notice from Linden Lab.

by David Talbot January 10, 2008

B2C Mail Order

Book printers in C15th
   Aldus Manutius of Venice 1498. His mail-order offerings included 15 texts he had published

(UK) William Lucas, Gardener, 1667
   Amy and Navy Stores supplied British Forces and other in India ~1871

(US) Tiffany of Fifth Ave 1845
   Montgomery Ward 1872

Sears, Roebuck made it possible to settle the West 1886
   US Postal services subsidised shipping by halving flat rates nationwide

Need guarantees to provide customer confidence
   Brand (e.g. Sears, Amazon)
      Sears unique innovation: “Satisfaction guaranteed or your money back”
      Zappos: free shipping on returns
   Industry (ABTA, MOPS)
   Intermediary (VISA, Access Paypal, etc)
Credit Cards

Consumer credit goes back to C18th - “The Tallyman”
   Some US stores offer “shopper's plate” from 1920s

Diners Club offered first credit card
   NY 1951: 27 Restaurants, 200 customers

Barclaycard offered as incentive to high-value Barclay customers in late 60s;
Access started as rival

Classic “Network effect”
   Need enough shops to attract customers and vice versa

Took off in early 1980s suddenly turning from loss leader to main profit centre.
   Some countries (e.g. Germany, Japan) only just taking off

Earnings from online trades starting to be significant
   PayPal, Apple Pay
Trusted Third Party

- Lawyers e.g. property
- Brokers e.g. shares
- Credit cards B2C
- Auction houses

Diagram:

Buyer

Cash → Goods → TTP → Goods → Cash

Seller

TTP
Credit Cards - 2

- Brand (e.g. VISA)
- Issuer (e.g. Bank)
- Acquirer
- Merchant

😊
Credit Cards - 3

Merchant is paid for goods by acquiring bank
less merchant discount (typically 2%-10%, often 4%-5%)

Transactions over floor limit checked with acquirer
hot card list or credit check with issuer

Brand takes a cut;
acquirer makes money from merchant discount;
issuer from selling revolving credit - expensive money, often over 20% APR
Credit Cards - 4

Overall cost of fraud varies

Motivation - who gets the reward?
- huge hype of hacking the system
- no case of fraud from interception
- real problem is old fashioned card theft

Overall pattern - cyclical : best defences not always high-tech

Fair Market

Willing buyer and seller
  “Fair price”
  Not under compulsion
  Price discovery

Equality of information
  “Reasonable knowledge of relevant facts”

Anonymity
  Pre transaction e.g. Stock market
  Pseudo anonymity e.g. Ebay (reputation)
  Post transaction

Settlement
Other ways to pay

Via phone wallets
e.g. Pingit

Electronic cash
  Chaum
  Bitcoins
  Game currencies

Issues
  Anonymity
  Exchange rate
  Regulation
  etc
Hot Topics

Who controls your identity?
Government, Bank, or Apple / Google
Identity cards, MS. Net

Lots of issues?
liability
control
civil liberties
protocol attacks
etc

Privacy
who owns your information?
what is it worth?