

E-Commerce

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Aims

- Outline issues involved
- Lectures:
 - Historic and Economic Background (JL)
 - Business Models and Strategy (JL)
 - Web Design (JL)
 - Implementation (JL)
 - The Law and E-commerce (AS)
 - Making E-Commerce work (JL)
 - Finance and future opportunities (JL)
 - RIP, DCMA and other legal developments (RC)

Resources

- Jack Lang “High Tech Entrepreneurs Handbook”
 - FT.COM; ISBN: 0273656155
- Ross Anderson “Security Engineering”
 - John Wiley & Sons Inc; ISBN: 0471389226
- Hal Varian “Intermediate Microeconomics”
 - W.W. Norton; ISBN: 0393973700
- + Carl Shapiro “Information Rules” Harvard Business School Press; ISBN: 087584863X
- Tom Standage “The Victorian Internet”
 - Orion Paperbacks; ISBN: 0753807033
- John Kenneth Galbraith: A Short History of Financial Euphoria
 - Penguin Books; ISBN: 0140238565

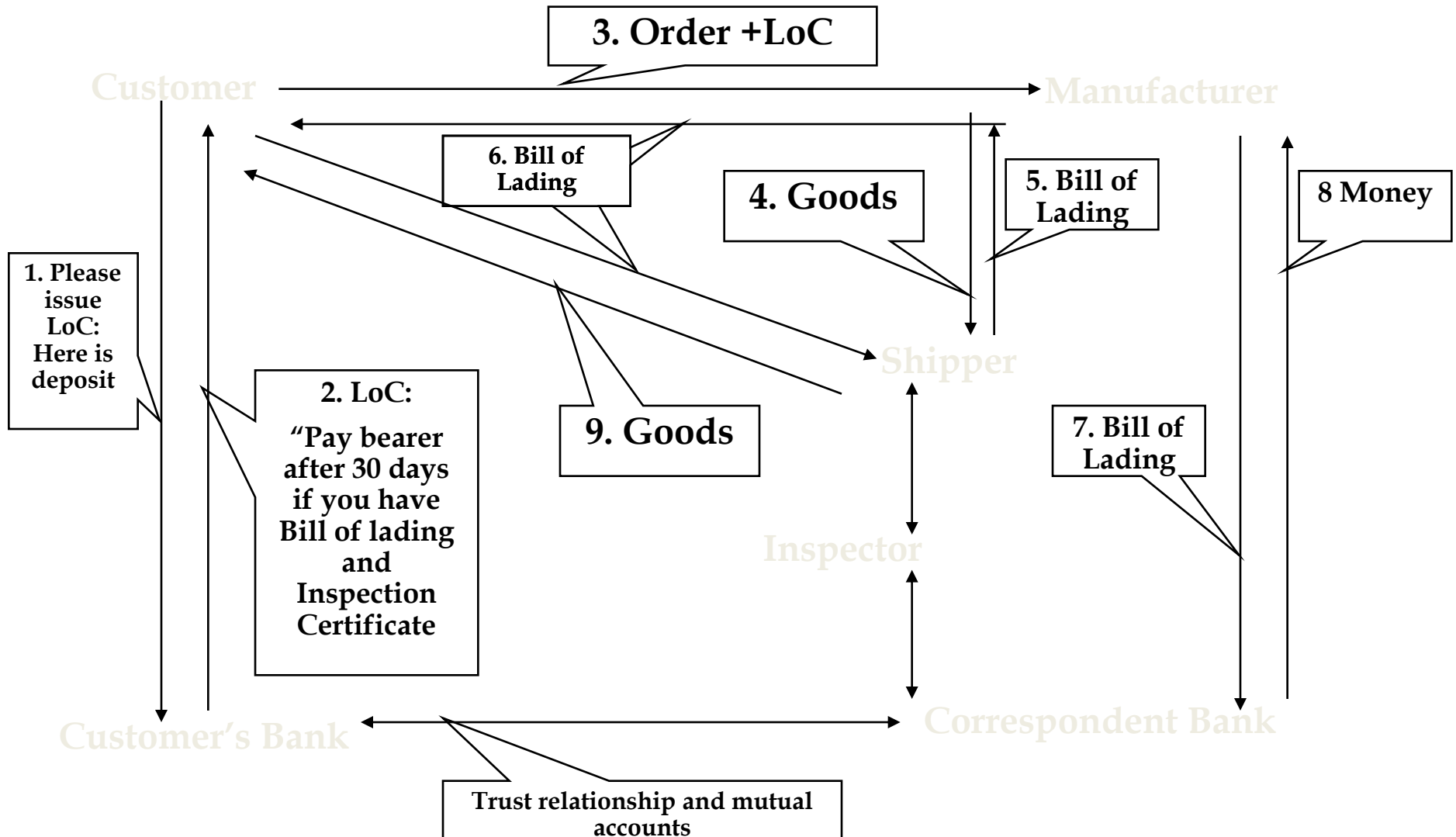
Online Resources

- Andrew Odlyzko's papers on e-commerce and network growth: <http://www.dtc.umn.edu/~odlyzko/>
- Web Design:
 - <http://www.wowwebdesigns.com>
 - <http://www.webpagesthatsuck.com>
- Draft regulations
 - http://www.dti.gov.uk/cii/ecommerce/europeanpolicy/ecommerce_directive.shtml

What is E-commerce?

- A course thought up by the Teaching committee...
 - Academic research on protocols, economics
- B2B
 - Replacement of paper with electronic documents
 - Re-badging of Electronic Document Interchange ('EDI')
 - SWIFT.CREST,BOLERO,Just-in-Time
 - Electronic money
- Mail-order ('B2C')...amazon.com etc
 - New business models...Lastminute.com, ebay.com
 - Disintermediation: E*Trade.com
 - CRM: Call-centres, credit-cards, cost-dumping, discrimination, customer aggravation, digital "haves and have nots"
- New opportunities for fraud
 - Dark web
 - This list is not exclusive!

Remote transaction



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.

B2B (2)

- The invention of the telegraph led to the development of business use protocols
 - Huge boom in telegraph construction and applications (Standage)
 - 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 3- 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 such as money, currency code, date etc.
- SWIFT reimplement 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

B2B 4

- “Electronic Document Interchange” (EDI)
 - Proprietary systems built late 60’s/early 70’s
 - General Motors ordering car components (EDS)
 - Marks & Spencer’s clothes ordering
- Big problem not security or DoS or lost systems but standards
 - 1980’s 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 internally
 - May cause inflation, exchange rate drop etc
 - “Cash is trash”
- “Unforgable” bearer certificate
- Anonymous, Immediate
- (mostly) Trusted

Minsky's financial instability hypothesis

- Hyman Minsky (1919-1996)
- Accumulation of debt causes instability
- Three stages:
 - 1. Hedge Borrower
 - Can repay interest and capital
 - 2. Speculative borrower
 - Can only repay interest = hopes asset will go up
 - 3. Ponzi borrower
 - Hopes appreciation of asset will pay both interest and capital
- Good times don't last

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Russian rouble in free-fall despite shock 17% rate rise



Raising interest rates could affect Russia's economic growth

Bulla (Sumarian about 3500 BC)



Business-to-business communications go back into antiquity

believed to have driven the invention of writing and mathematics

Trust system

Macro economics:
Modern Monetary Theory

- MMT
- <http://neweconomicperspectives.org/modern-monetary-theory-primer.html>

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

– Govt Private Foreign

– $(G-T) = (S-I) \quad - NX$

– where G is government spending, T is taxes, S is savings, I is investment and NX is net exports

- -> Private wealth ~ Government deficit or trade surplus

Bearer certificates

- Token representing value
- May be anonymous
 - Cash vs Cheques
- Not easily forged
 - 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**



X

GBP per 1 XBT

30 Dec 2014 00:00 UTC - 30 Dec 2015 17:49 UTC

XBT/GBP close:287.98274 low:107.97212 high:312.31092

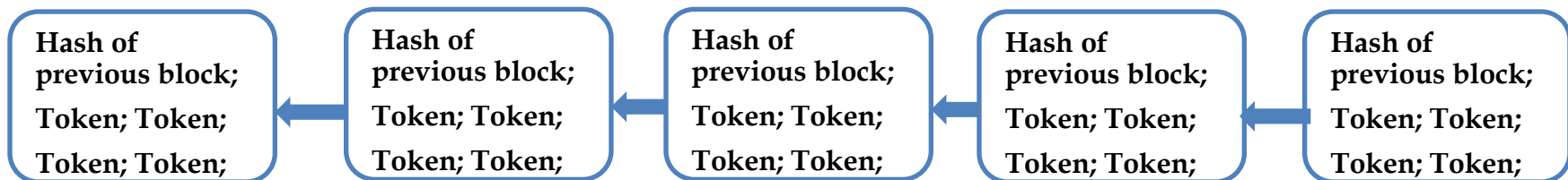


- Hard (repudiatable) vs Soft (no recourse)

Electronic money

ID (user's public key)
Value
Date
Serial etc

- Unforgeable token
 - eg (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
- Typical “Reserve Ratio” is 10%

Game money

- Monetisation for F2P apps
- Multiple currencies gives easier control
 - Hard/soft currencies
 - “Buy this sword for £9.99 or 10,000 credits”
 - Price points:
 - \$4.99, \$9.99, \$19.99, \$49.99, \$99.99



Angry birds

- Multiple tradeable game objects
 - Wood, gold, 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
 - Insurance, stock markets
- Pseudo anonymous?

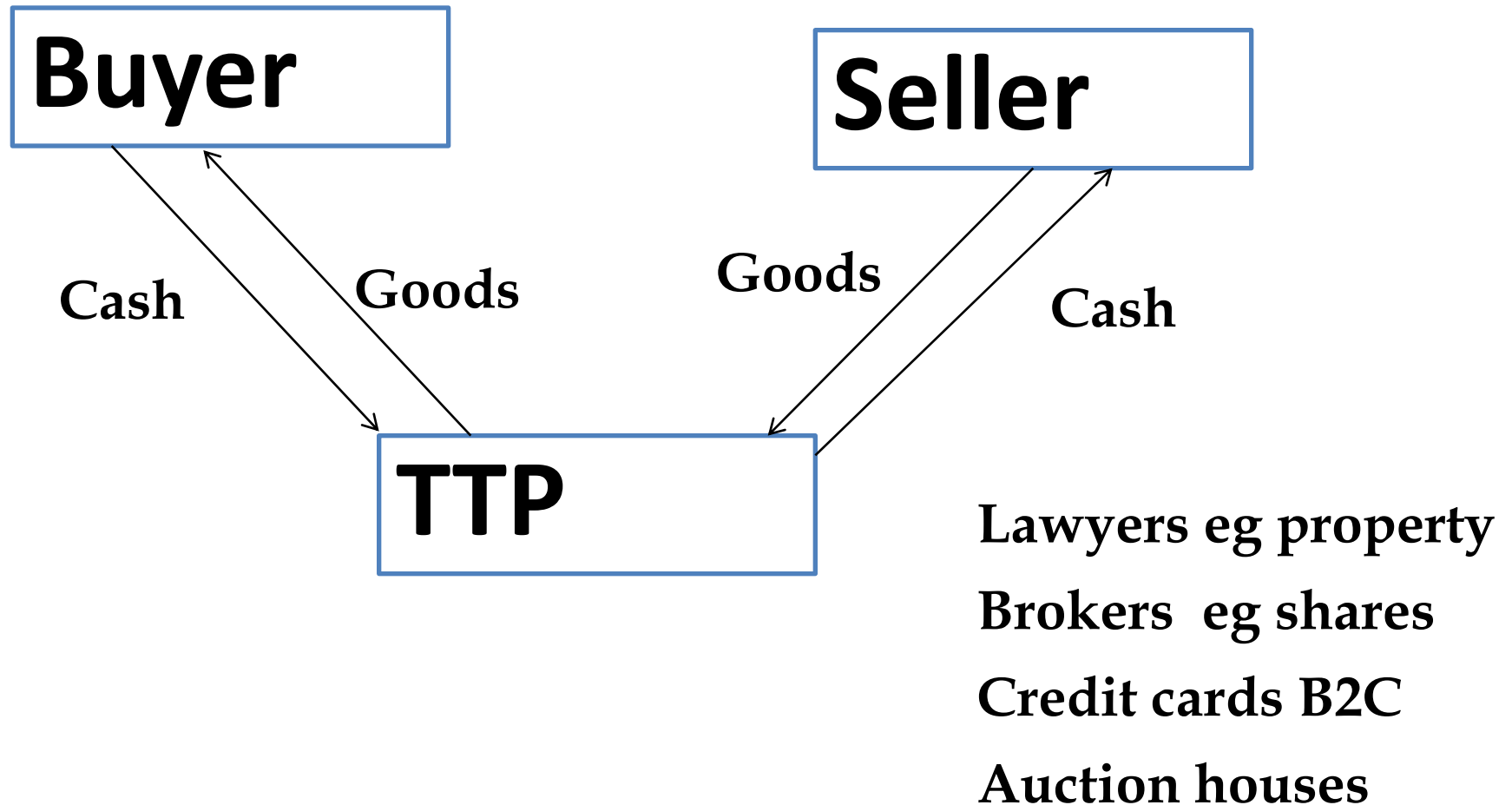
B2C Mail Order

- Book printers in C15th
 - Aldus Manutius of Venice 1498. His mail-order offerings included 15 texts that he had published.
- (UK version) William Lucas, Gardener, 1667
 - Army and Navy Stores supplied British Forces and others in India ~1871
- (US Version) Tiffany of Fifth Ave 1845
 - Montgomery Ward 1872
- Sears, Roebuck made it possible to settle the West(1886)
 - US Postal services subsidised shipping by having flat rates nationwide.
 - Still critical in some places!
- Need guarantee to provide customer confidence
 - Brand (e.g Sears, Amazon...)
 - Sears unique innovation: “Satisfaction guaranteed or your money back”
 - Industry (ABTA, MOPS)
 - Intermediary (VISA, Access Paypal etc)

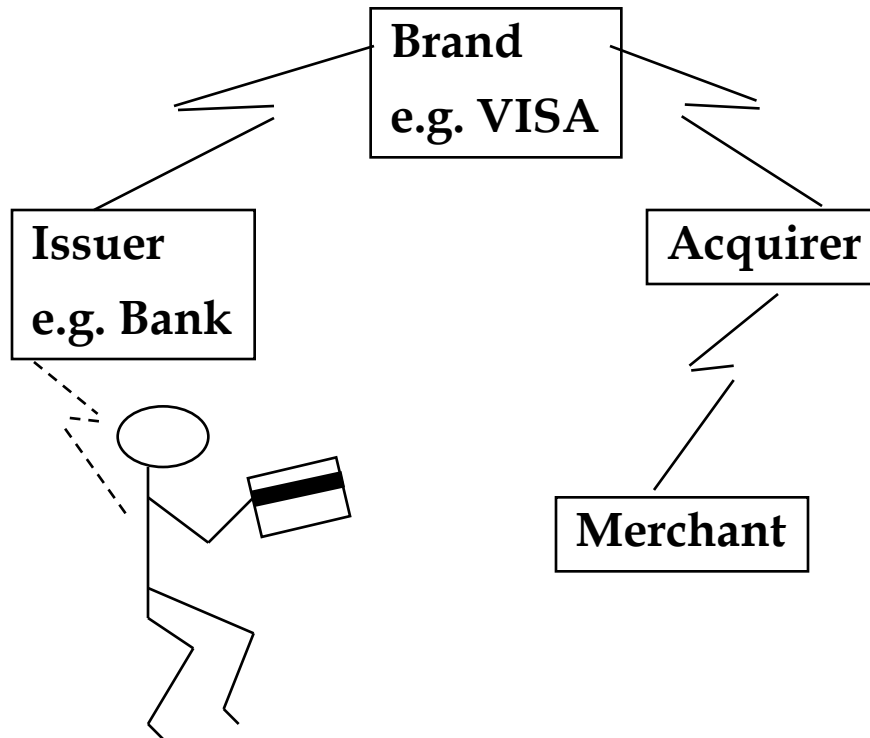
Credit Cards

- Consumer credit goes back to 18th Century – “The Tallyman”
 - Some US stores offer “shopper's plate” from 1920's
- Diners Club offered first credit card
 - NY 1951: 27 Restaurants, 200 customers
- Barclaycard offered as incentive to high-value Barclays customers in late 60s; Access started as rival
- Classic “Network effect”
 - Need enough shops to attract customers and vice versa
- Took off in early 1980's 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
 - Competition starting e.g Paypal

Trusted Third Party



Credit Cards 1



Credit Cards 2

- 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

Cards 4

- Overall cost of fraud
 - Spain 0.01%
 - UK 0.2%
 - USA 1.0%
- Motivation – who gets the reward?
 - Huge hype “Evil Hackers”
 - No case of fraud resulting from interception!
 - Getting sense from mail is hard
 - Real problem: hacked or crooked end systems
- Overall pattern – cyclical: Best defences not always high-tech!

Cards 7

- Bigger problem: disputes
 - Porn sites
 - Paypal etc
- Incompetence, fraudulent denial by customers, outright fraud by merchants
- Control mechanisms poor and slow – e.g acquirer call centre can only check country, not cardholder address
- Technology?
 - SET failed
 - Other formats, e.g stored value cards, cell-phones

Fair Market

- Willing buyer and seller
 - “Fair price”
 - Not under compulsion
 - Price discovery
- Equality of information
 - “Reasonable knowledge of relevant facts”
- Anonymity
 - Pre transaction eg Stock market
 - Pseudo anonymity eg 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

- 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?