



CS207 #6, 30 Oct 2009

Gio Wiederhold

Gates B12

Homepage at

<https://cs.stanford.edu/wiki/cs207/Main/HomePage>



Syllabus:

1. Why should software be valued?
2. Principles of valuation. Cost versus value.
3. Open source software. Scope. Theory and reality
4. Market value of software companies.
5. Intellectual capital and property (IP).
6. Life and lag of software innovation.
7. Sales expectations and discounting.
8. Alternate business models.
9. Allocation and lag.
10. Patents, copyrights, and trade secrets. Licensing
11. Separation of use rights from the property itself.
12. Risks when outsourcing and offshoring development.
13. Effects of using taxhavens to house IP.



Patents



A patent provides the right to *exclude others* for a period from making, using, selling, offering for sale, or importing the patented invention

- US 1790: *An Act to promote the progress of useful Arts* by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries.
- It should be “non-obvious” 1778 ↗ 1836 ↘ ↗ 1920 ↘ ↗ ↘ 1960 ↗
- and have “utility” ↘, “novelty” ?, “enablement” ?
- Period is 20 years from the filing date subject to the payment of modest maintenance fees. (1474 Venice 10 years)

- A patent is a limited property right
It may be sold, licensed, assigned, transferred, donated, ...



Patents and SW

- Algorithms as such cannot be patented
 - The implementation *`placed into practice`* can
 - A patent should *`teach`* the reader what the invention encompasses, and provide public knowledge
- Writing a patent is hard
 - Legal costs \$30 000 and up
 - Too much detail: a competitor can change insignificant detail.
 - A computer program listing won't do!
 - Wording is critical  Use tank instead of a frame  Use tank to reinforce the frame
 - Too little detail: prior art to invalidate may exist
 - Prior art is mainly earlier patents, in their wording
 - If the *`prior art`* is not found an invalid patent may be granted
 - Having three knowledge bases <http://harmfulpatents.org/>
 - Software does not use very consistent terms, marketing words
 - Once granted, it is very costly to invalidate a patent



PTO problems

Patent and Trademark office

1. Originally had to show model to the patent office so they could see how it worked. That became awkward
 - Now, a description is sufficient
 - No requirement of proof that it works
 - A description of a complex process is hard to validate
2. If patent examiners does not understand a patent
 - They will likely grant it
 - Recent: prepublication and public comments as additional input
 - And leave it to the courts to decide about validity
 - Can take years and \$100 000s
3. Any system level development can imply 100's of patents
 - Finding all relevant patents and getting permissions takes time and money
 - Missing one patent from a recalcitrant source can kill a company when it is otherwise successful [nearly happened to Blackberry]
 - To enable the aircraft industry in 1940's US Gov. created a pool of patents




Copyrights ©

- Owner is the author or payor if `Work-for-hire`
- Again an `Exclusionary right`, must be defended
 - Same 1790 law, then 1886 Berne for international (US signed in 1989!), 1952 UNESCO, now WIPO.
 - Period varies from 50-100 years after author's death (originally (1710 UK) 14), corporations different
- Documentation
 - Formal registration with Library of Congress, renew @28years
 - Just publishing with ©date (self mail, bank deposit, web)
 - No longer formally needed in the U.S.
- Rights can be sold ...



Copyrights and SW

- Derivative, adaptive works require permission
 - Sketches of *Mickey Mouse*, ads with *Elvis*
 - Anthologies
 - Binary code
 - Open source permissions
- Fair use
 - Quotations in critiques
 - Copies made for backup, etc.
- Registration with Library of Congress with a partial listing, sufficient to establish uniqueness.



Problems with copyright and SW

Does not protect the idea

- Clean-room setting permits creation of equivalent SW
 - BIOS for the IBM PC was recreated 1983 by Phoenix for COMPAQ
 - IBM-Fujitsu case for later OS-360 version
 - Settlement: Fujitsu did not succeed, had to pay \$51M to IBM again
- Systematic edits can hide copying.
 - Variable substitution, remove comments, ...
 - Anti-plagiarism SW can check many tricks
 - Authors can insert identifiable, spurious code
 - Authors may insert time-bombs.
- Copier may protect stolen source code as trade secret
 - only release hard-to-trace binary code.



Trade secret

- Origin in Roman law: *Actio servi corrupti*
 - Bribery, kidnap of servants/slaves to divulge secrets
 - Guilds in the middle ages protected their secrets
 - watchmaking, black-cloth dying,
- Modern requirements
 - Specific Agreements +for company / +for employee?
 - Non-disclosure agreements
 - Employees, Consultants, Contractors, Customers, Tax officials
 - Invention assignment agreements to cover
 - Invent for hire, invent using resources, invent independently
 - Non-competition agreements (limits differ by state: CA↓ MA↑)
 - Even covering one's own inventions, but not routine knowledge
 - Are limited in time (3 months to 3 years), but deceit is a violation
 - Must be defended when a violation is known



Trade secret and SW

- Reverse engineering of public SW here is legitimate!
- Getting a patent invalidates the trade secret
- Determining loss of trade secret is hard
 - Knowhow
 - Software development practice as Extreme programming
 - Code and Documents
 - Often voluminous and code must match precisely
 - Having labeled documentation helps greatly
 - `company confidential`
 - Tracking of documents and document copying
 - Meetings in room without personal, but corporate recording
- Prosecution is hard
- Also applies to marketing schemes



Problems with trade secrets

Covers majority of IP value in modern companies

- Period of usefulness is limited in practice
 - ... but adequate given simplicity versus patent, copyright
 - Contracts should not infringe employee mobility / betterment
 - Doctrine of 'inevitable disclosure' even without a non-compete contract
 - State laws differ: California supports mobility, leakage; Midwest less so
 - » Dishonesty or aggressiveness on either side can make the difference. Use facts.
- Reasonable practice is hard to convey
 - Legalistic forms make enforcement awkward
 - Brief summary and discussion with signer should be routine
 - Exceptions should be possible: *student intern vis-à-vis professor*
- But do not hire employees based on loyalty versus smarts
 - Pay for loyalty commitments as well as for smarts
 - Employee should receive a comparable benefit for signing a restrictive covenant, now at termination – a parachute.




IP protection

- Patents
 - Use only if the invention is visible in the product
 - Or use to hinder others “blocking patents”
- Copyright
 - Protects source code and chip masks
 - Not the underlying ideas
- Trade Secret
 - If it can be kept secret, best choice
 - Must be defended: NDAs, action when violated

Selling IP +

Bundling & valuing the bundle

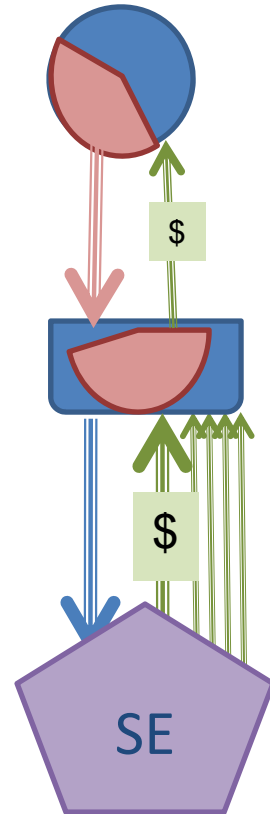
1. Piece by piece  or
2. Fraction of the company – say, *all sales in Europe*
3. Can include available knowhow (+) for maintenance

1. Package the bundle

- Create a subcorporation to hold the rights to the IP+

2. Sell the subcorporation *to European sales co.: SE*

1. Receive a single payment matching the value
 - Requires a well-off buyer
2. Receive payments over time of equivalent NPV
3. Make a royalty (fraction of SE's sales) arrangement
 1. A fraction of sales at SE commensurate with the amount of IP
 2. A period that is sufficiently long to recover the IPs NPvalue
 3. A premium to compensate the seller for the risk of SE defaulting





Internal sale Tangible example



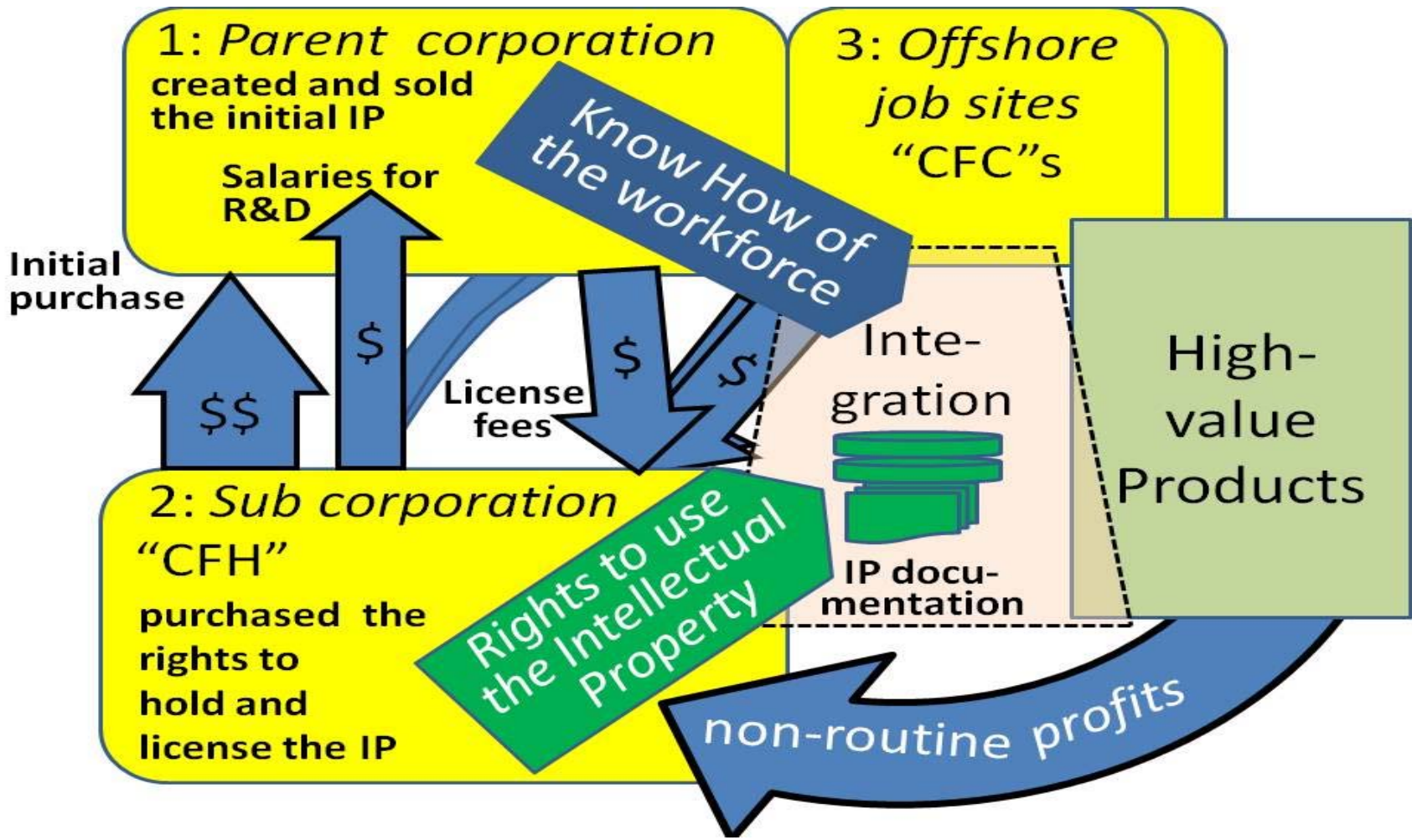
1. A US company, *USco* needs cash. It owns a splendid HQ building
2. *USco* may sell its HQ building to a real-estate enterprise *REco* with a provision that the *REco* will lease the building back to *USco*.
3. If *USco* has received a fair value for the building, *USco*'s total tangibles remain unchanged until it spends the money it received
 - *REco* may offer an attractive lease because of tax advantages.
4. Actually, *REco* can be set up by *USco* and controlled by *USco*, which also remains its only tenant.
5. Nobody moves and few employees will notice a change.
 - There is a new brass plaque on the building
 - A sign '*REco*' on the door to the rooms housing the people who maintain the HQ.
 - The public consolidated annual report of *USco* only lists the name and location of the controlled subcorporation *REco*; the assets of both are combined.
6. Since the lease receipts at *REco* and payments by *USco* are similar, the more complex financial flow is invisible.



Internal sale For intangibles

Procedure functionally identical to tangible example, but

- Even less visible
 - IP transactions are harder to value than buildings
- IP is a much larger fraction of corporate value than HQ
- The consumers of the IP are the sales organizations
 - Not the tenants
- Typically involves three or more entities
 1. Parent company, creator, or sponsor
 - Creates and maintains the IP
 2. IP holding company, often in a tax haven
 - Buys IP initially and pays for its maintenance. Licenses its use.
 3. IP consumer: selling company
 - Buys license to use the IP in products it sells, pays royalty to IP holder
 4. Off shore IP generators → more to come





Offshoring

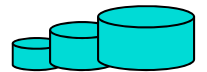
Task transfer to Enterprises in Foreign countries

Two aspects:

1. Work migration: jobs are moved to lower-cost countries



2. Support software etc. is moved to enable similar productivity in those countries



Income is generated by people and
(intellectual) capital



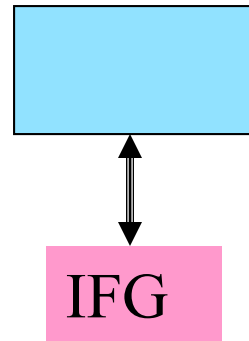
Hypothesis

- Offshoring of jobs is effective because of concurrent Intellectual Property (IP) transfer
- Much of that IP is corporate property
- Transfer of corporate IP is poorly understood
 - IP as property is not well defined, hard to measure
 - There are many components to IP, coming from
 - *open source*, **R&D**, **marketing**, **reputation** as
 - Patents, copyright, trade secret (covered by NDAs)
- Still, IP transfer is a valuable, significant export



Types of Foreign Entities

- **Independent Foreign Contractors**
 - IFG may serve multiple customers
 - Share trade secrets with competitors
 - Owners need contracts to protect the IP
 - Hard to monitor and enforce
- **Owned, Controlled Foreign Corporations**
 - CFC provides much more control over IP
 - Ownership often in third-party countries
 - Avoids **taxation** of sales to other countries





Knowledge is the Link

To be effective a worker has to know what has to be done

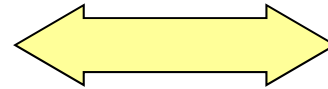
- call center employees
- technicians
- engineers
- managers

- That knowledge consists of

- The technology

- Documentation, prior versions, quality control

- The business methods



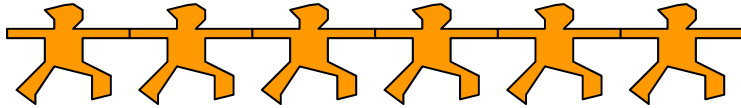
- How technology in the product is marketed
- The flow from buyers to improved products and methods

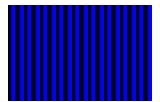
- Companies distinguish themselves by proprietary IP

1. Patents, sometimes Copyrights
2. Confidential Documents
3. Knowledge within its people - protected by NDAs



To illustrate: a Sequence of Hx cases

- Moving from Sales to Transfer of property
 - Country-based vs. Global companies
- Moving from Tangible to Intangible
 - Visible & measurable, barely so, or not at all
- Intangible property with Intangible knowledge
 - Services versus Patents and Trade Secrets
- Outsourcing 
 - Work and its enablers: human and intellectual capital



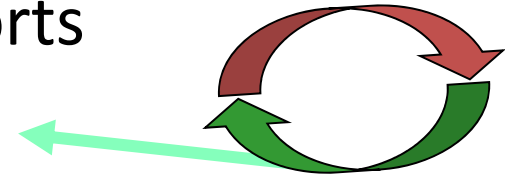
Definitions emerge as we proceed through 10 cases

Case 1: Tangible export only

U.S. Machine tools * producer U

* To simplify: tools are not innovative, could be built anywhere

- U exports its products to foreign countries
 - Receives payments for those exports
 - Pays taxes on resulting profit



IP Note: U supplies documents for use of the machines.
Those documents may be copyrighted.
But copyright does not protect intellectual contents,
only protects outright copying.
Rarely valued.



Case 2: Tangible transfer

Global Machine tools producer **G**

- Exports machines to **G's CFC factory F** ,
to be used in production of other products at **F**
 - **G** receives transfer payments **T** from **F** for those exports
 - Must show that the transfer price **T** is reasonable
 - Should match prices of external sales by **G**, or by other Co's
 - Unreasonably low transfer prices imply U.S. tax avoidance and hiding profits at a foreign base.
 - Pays taxes on resulting profit

But it's hard to be profitable without distinguishing abilities: IP



Case 3: Tangible + market value transfer


Renowned r Global Machine tools producer R

Reputation r is due to investment in quality and advertising

- Exports machines to its CSC factory Q

- Gets higher prices $T+$ for external sales because of r
- R receives transfer payments for the internal exports
 - Transfer price includes r when based on its $T+$ export prices
 - Harder to assess when there are no exports, and other companies in the business have different reputations
 - Reputation r is IP due to marketing & product quality
fast effect - *long-term effect*

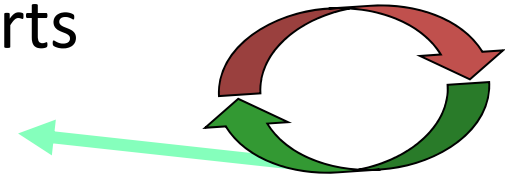
- Pays taxes on resulting profit



Case 4: Intangible export \approx Case 1

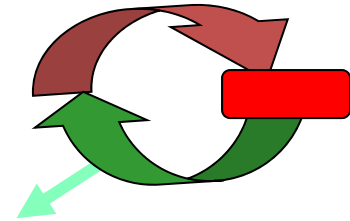
U.S. Software tools creator and producer

- Exports software to foreign countries
 - Receives payments for those exports
 - Pays taxes on resulting profit
- *Problem: software is easily copied*
 - Protection desired, achieved by combination of
 - Only issuing licenses -- *avoids property rights issues*
 - Copyright laws and patents -- *requires govmnt cooperation*
 - Making copying hard -- *technology game*
 - Restricting maintenance -- *works for critical packages*




Case 5: Intangible transfer \approx Case 2

U.S. Software creator and producer
with foreign distribution



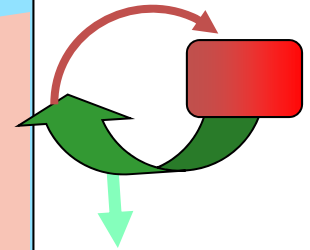
- Exports software products to foreign subsidiary, to be marketed and sold there
- Receives transfer payments for those exports
 - Must show that the transfer price is reasonable
 - By comparison with other sales by self, or by other co's
 - More difficult to assign value than tangibles.
 - Pays taxes on resulting profit



Case 6: Intangible manufacturing

U.S. Software producer with foreign distribution

- Exports software master to its subsidiary, to be copied*, marketed, and sold there
- Receives transfer payments for single export
 - Must show that the transfer price is reasonable
 - One instance allows thousands of sales, generates substantial ongoing income over its lifetime
 - Valuation requires projection of income over life
 - When is income realized? What is the life of the software?.
 - Pays taxes on resulting profit




** equivalent to manufacturing; writing software is considered R&D*



Case 7: Intangible transfer, joint creation

Software producer with foreign specialists

- Exports software master to its subsidiary, and **adapted, copied, marketed, and maintained there**
 - Source of foreign part of knowledge is remote
 - Assume cost of all R&D centrally accounted
- Receives transfer payments for those exports
 - Must show again that the transfer price is reasonable
 - Share R&D cost according to locale of revenue
 - Credit foreign R&D against foreign revenue
 - Pays taxes on U.S. assignable profit of foreign sales



Case 8: Shared intangible creation

Global Software producer

- Develops globally, perhaps 24/7
 - Shares all knowledge globally at initiation
 - Assume cost of all R&D centrally accounted
- Transfer payments should move both ways
 - Must show that the transfer prices are reasonable
 - Use of prior IP accounted for, or Buy-out
 - Allocation? cost, hours?
 - Compute balance
 - Pays taxes on U/S. balance of profit.



Case 9: Extreme offshoring

Company offshores everything

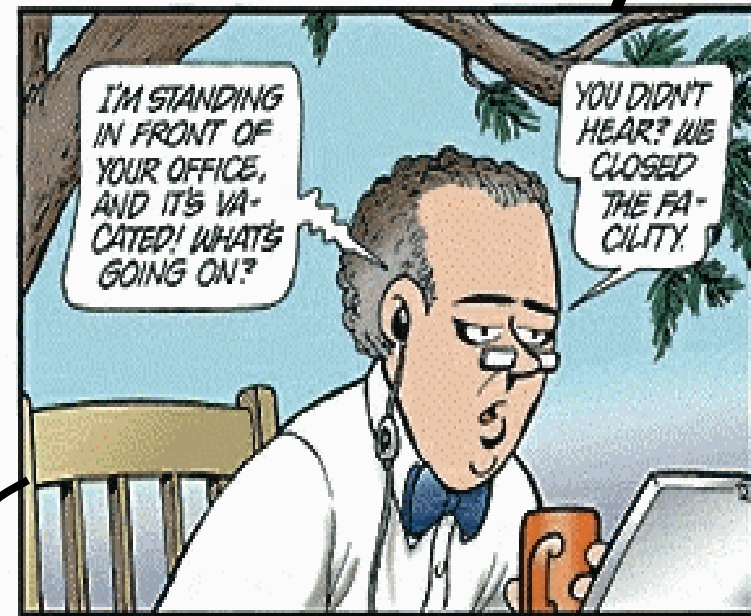
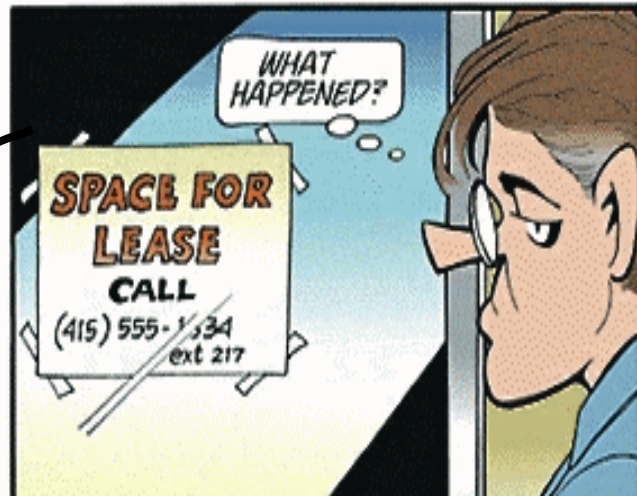
R&D, Production, distribution, service, feedback

- All IP has been exported
 - Value of export is value of entire company, except for tangibles (HQ building, cash, option income)
 - All income is offshore
 - Only profits needed for dividends are repatriated
 - No U.S. taxable income on continuing operations
 - Initial export of IP should be (have been) taxed?

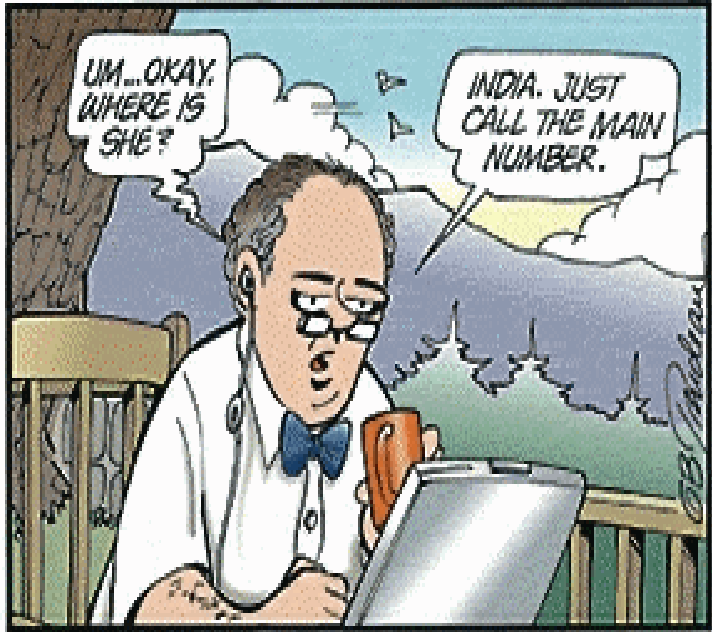
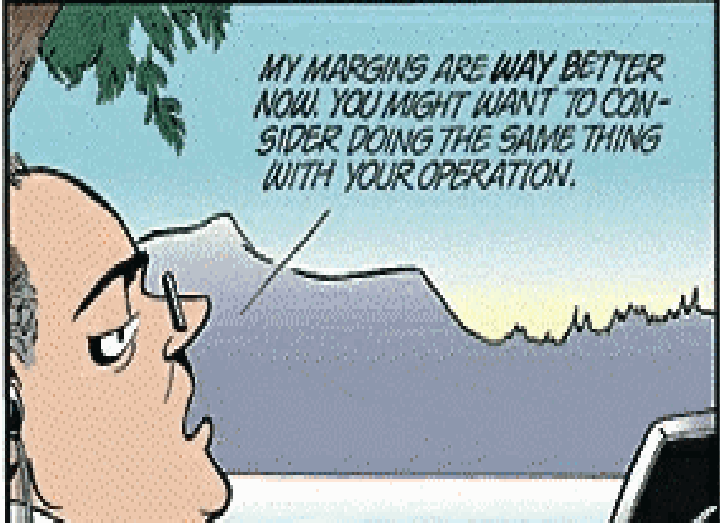
Doonesbury 1/2

September 21, 2003

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Doonsbury 2/2





Case 10: Inversion

The foreign subsidiary (CFC) uses its profits to buy the U.S. Base (USB) company

- CFC creates a second-level subsidiary (CUS) in the U.S.
- CUS merges with USB, considered a (368)(a)(2)(E) reorganization
- USB stockholders trade their shares for CUS shares, may be taxable
- USB is now a subsidiary of FS; and FS is not subject to U.S. tax
- Stockholder value is unchanged, but their control is diminished
- For sales to the U.S., royalty is now due to the IP owner
 - Tax deductible expense