

The Hows, Whys and Wherefores of Open Source

or

Open source as a market reaction to regulation of the software industry

or

Why everything you've ever been told about IP is wrong.

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Overview



- Some economic theory (not an economist)
 - Public goods
 - Tragedy of the commons
- The Chosen Solution
- About the software industry
- Example of open source product (Apache)
- Assumptions of old software development model
- Open source
- Some more economics
- Some things you can think about
- Some comments on Policy

Short History



- Apple Case (1983)
- Changes to the Copyright Act effected within 6 months of the decision
- Did not wait for the High Court appeal (1986 – affirmed the decision).
- Why was it a problem?

Collective Consumption Goods



- Consumption by one consumer does not reduce consumption by any other
- Also “non rivalrous”
- Television broadcast
- Theatre?

Excludability

- How easy is it to exclude others from using a good once it is produced?
- Nonexcludable = difficult to exclude others from use
- Matter of degree
- National defence
- Software?
- If a good is nonexcludable each person has incentive to consume without paying for production or maintenance (as it will be available to them anyway)
- “free riding”
- Tragedy of the Commons

Public Goods

- Goods which are:
 - Non rivalrous or collective consumption and
 - Non excludable
- Incentive to free ride creates financing problem
- Especially sharp for
 - capital intensive projects
 - indivisible goods
- Result in “Market Failure” - ie underproduction of the good

Options



- Do Nothing
- Government Funding
 - Direct
 - Indirect
- Make a system which encourages private funding without mandating it.

Property rights

“Primary function of property rights is that of guiding incentives to achieve a greater internalisation of externalities”

Harold Demsetz “Toward a Theory of Property”

The American Economic Review Volume 57, Issue 2 May, 1967, 347-359

<http://www.compilerpress.atfreeweb.com/Anno%20Demsetz%20Property%20Rights.htm>

Joining the Dots

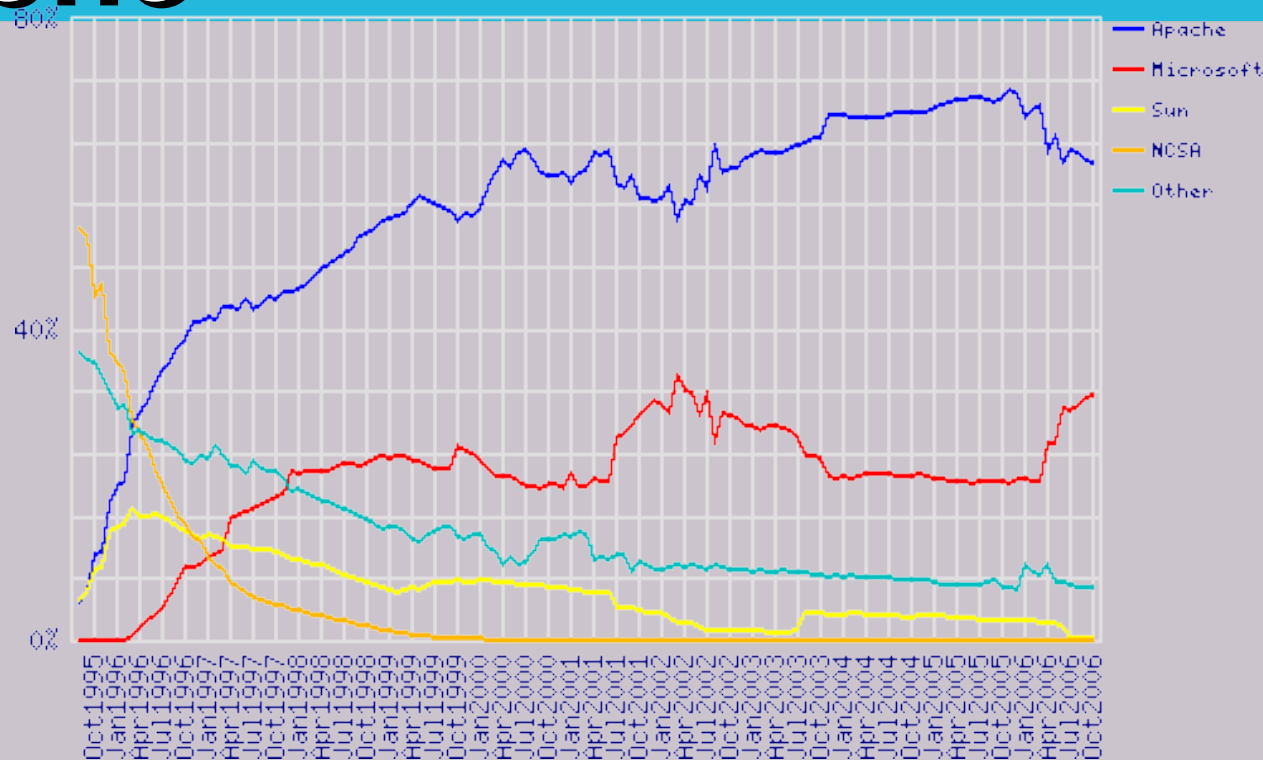
- Software is a public good
- Because of its nonexcludable character the release of software gives rise to externalities (ie people copying software)
- Hence insufficient incentive for the creation of software = market failure
- Questions?
- Suggestions?

Therefore “Intellectual Property”



- Collections of exclusive rights granted by State through legislation to achieve specific consequences
- Copyright = incentive for creation of works
- Patents = disclosure of inventions (NB: query whether actually stimulates invention because secret use is already an incentive)
- Necessary to have property because without it insufficient incentive to invest in software (no single organisation will be able to aggregate capital to fund development).
- June 1984 Copyright Act extended to cover electronic reproduction

Non Existent Software - Apache



- Web server software, Available at no charge, FOSS
- Runs 61.44% of all internet sites (Netcraft October 06) NB: upswing in April 06 from Microsoft agreement with GoDaddy to park inactive domain names on Windows Server 2003

http://news.netcraft.com/archives/web_server_survey.html

Some examples of things which don't exist

- Linux, Apache, MySQL, PHP, Email
- Internet protocols
- Vast majority of information available over the internet – compare its closed predecessors
CompuServe/AOL/Prodigy/MSN
- How is their existence possible - even in theory?
- Once created, how can they compete with closed source?
- Is there something wrong with the theory?

Assumptions about IP - Software



- Software development assumption – indivisibility:
 - Driven by firms (ie non-collaborative, in house at one software developer)
 - Speculative/“big bang” model?

Assumptions – Development Driven by Firms?

- Coase's Theory of the Firm
- Firms arise as a response to transaction costs in market.
http://people.bu.edu/vaguirre/courses/bu332/nature_firm.pdf
- Coase's arguments about firms implicitly assumed
- Do they remain true in a networked world?
- Coase's penguin
<http://www.benkler.org/CoasesPenguin.PDF>
- Need for a firm is a *consequence of and not a justification* for imposition of copyright (as copyrights create transaction costs)
- Need for firm can be removed from the theory with appropriate licensing overlay.

Assumptions about IP – Speculative Model/ Big Bang



- IE: Not possible to fund big projects because of funding risk
- Linux kernel estimated at US\$200 million-US\$600 million to code from scratch (kernel represents about 50MB of the 2.4GB of a typical generalist GNU/Linux distribution)
- Clearly can develop very expensive systems without the need for amortising development costs into licence fees.
- Software:
 - is highly *divisible* and
 - may be recombined in different configurations
- Funding problem from public goods analysis is therefore questionable.

Assumptions about IP

- Apache



- Early version of Apache Licence - Do what you like with it but:
 - give us credit where due
 - don't use our name for your own projects
 - No warranty.
- Apache group took a punt that benefit from closed source commercialisation of their work out put was less than cost incurred in acquiring third party outputs, esp. when transaction costs added to the mix
- Apache members got benefit from their development of a component at least equal to their cost of development of that component

Linux Kernel



- Originally distributed under purpose based restriction (no commercial use)
- Adopted GPL (no purpose restrictions on use, modifications permitted, modifications which are distributed must be subject to the same licence)
- GPL has practical effect of co-opting development work
- Apache and Linux created a licensing overlay resting on top of copyright which eliminated transaction costs
- Distribution is king.

Practical consequences

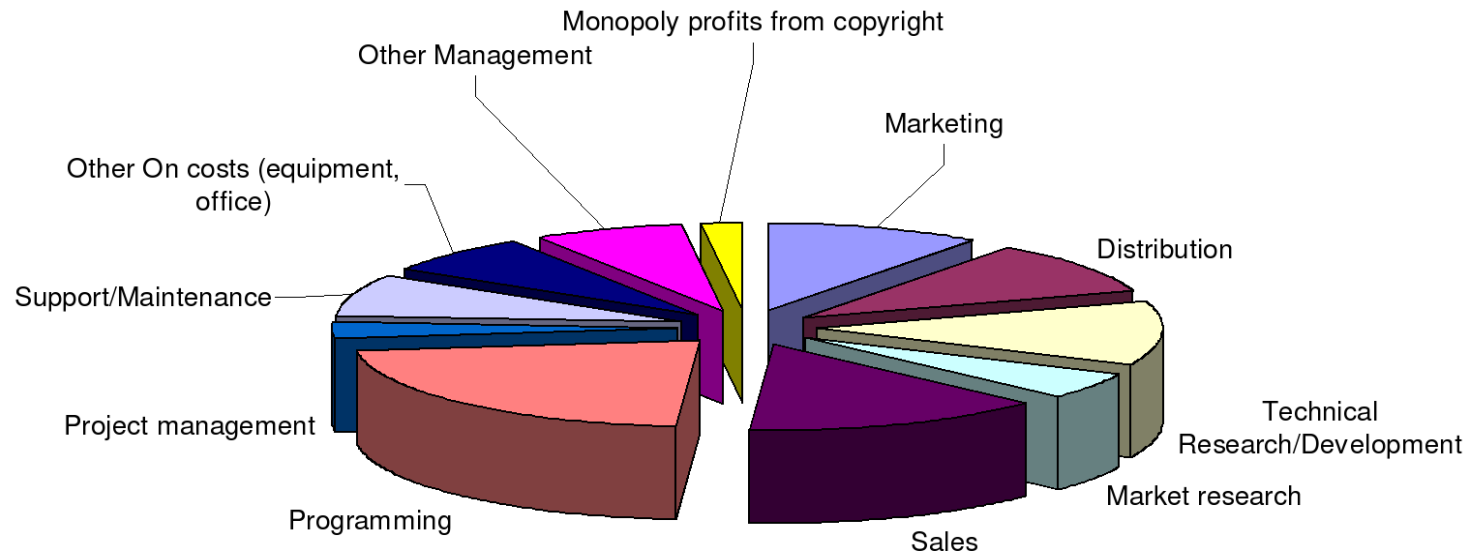


- Record of copyright in
 - producing software?
 - creating a competitive software market?
 - productivity?

Hypothetical Breakdown of Software Sale Price



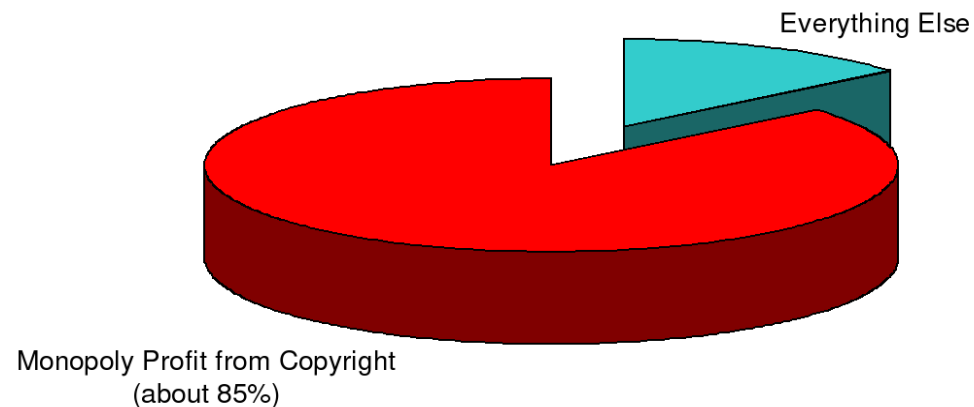
Hypothetical Breakdown of Software Sale Price



Actual Breakdown of Software Sale Price



Actual Breakdown (Microsoft Office, SEC filing 2002)



Reference: <http://zdnet.com.com/2100-1104-966219.html> (November 2002)

Software Market Today



- High level of concentration in particular product areas
 - OS
 - Office apps
 - Database
 - Web Servers
 - Internet browsers
- Enterprise software often tied to maintenance, calculated at x% of licence fee
- All the more surprising because the sizes of these markets are enormous

The Software market today

– Natural Monopolies



- Where average cost decreases with increasing demand
- Eg: software, telecommunications?
http://en.wikipedia.org/wiki/Natural_monopoly
- Tends to:
 - be a winner take all game
 - (may prefer first movers, tends to entrench position of incumbents)

The Software market today

– Network Externalities



- Other people's use of good increases good's utility
- Eg: telephone networks, .doc format
- Tends to:
 - prefer first movers,
 - entrench position of incumbents
- Margolis and Liebowitz dispute the existence of network externalities see

<http://www.utdallas.edu/~liebowit/jep.html>

The Software market today

- Contestability



- Describes difficulty competitors have in entering a market
- Software markets do not appear to be very contestable at a product area level
- Customer lock in, high switching costs
- Lack of contestability possibly a result of natural monopoly nature, network externalities involved

Schumpeter



- This is a good thing
- Increases profits for incumbents, causes aspiring monopolists to fight hard for the ground
- Drives innovation
- “Creative destruction”

Alternative Interpretation



- Approach has created serial product level monopolies
- Unnecessarily
 - inflates prices
 - Reduces productivity,
 - quality

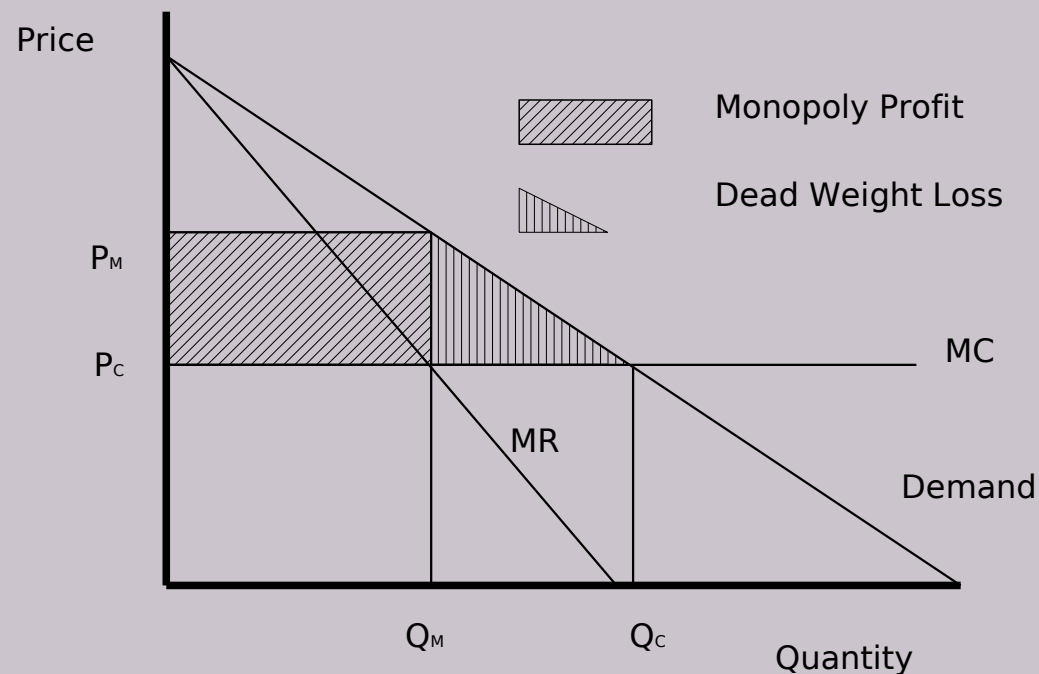
Policy - What can go Wrong



- Create monopolies
- Monopolists use IP to form oligarchies/cartels
- IP beneficiaries waste resources extending benefits

About Monopolies (diversion)

Pricing in a Monopoly



Note: assumes marginal cost to produce is independent of quantity

- Efficiency – that which maximises wealth across an economy

Cartels (History)



- Agreements among competitors can increase profits for competitors by (eg): limiting supply, dividing territories, setting prices
- Hard to police (members break ranks), may be illegal
- Formation of “trusts” in US – legal ownership of assets in a central company, controlled by trustees – easier to police. Standard Oil Trust Agreement 1879 (others followed). (Rockefellers)
- Trusts were founded on the property rights in the assets controlled by the trust
- Public outcry as prices increased, service declined.
- Sherman “Anti-Trust” Act made trusts illegal (1890)
- “Anti trust” has come to apply to more general competition regulation.

Cartels



- Post sale control over asset permits implementation of traditional cartel
- Exclusive licensing deals
- Market sharing arrangements
- Often explicit exemption from competition policy (eg s 51(3) TPA)
- Aside: also Price fixing/tax games (as the price of the IP is fluid)

Other Problems with Government intervention in markets



- Rent seeking behaviour (Gordon Tulloch)
http://www.thelockeinstitute.org/journals/luminary_v1_n2_p2.html
- Distortion of market – overcommit resources to one sector at expense of others
- These aspects explain much of the disparity between price predicted by classical economics (marginal cost of production) and actual price in the market.

About Intellectual Property

- Copyright Act has the effect of manufacturing excludability
- For the purpose of internalising an externality.
- Exactly what externality is being internalised?
- Is it negative?
- Do we try to create regimes to internalise these externalities in other situations?
- Looking at flowers from across the road.

Intellectual Property?

- If you sell property, you cease to control its exercise – relationship ends upon paying sale price
- Not true of intellectual property
- Effects a product level monopoly over goods
- Property as “right to exclusive possession”?
- Copyright not exercised as a right to possession or use, but a negative right to prevent others from using.

About Intellectual Property

- Boldrin + Levine



- “Intellectual Property” is in the first copy – note: excludable, possibly rival
- “Intellectual Monopoly” is Government intervention to restrict use of and acts in relation to an idea/copy post the sale of that idea/copy.

<http://levine.sscnet.ucla.edu/general/intellectual/against.htm>

Property Nature Comparison



- Typical “rights” of “purchaser” post sale.
- Hammer – no post sale use restrictions, no restrictions on modifications, no limits on resupply or on supply
- Which of these seems more like property?
 - Closed Source software: use restrictions (may be variously based/styled), modification, resupply, on supply prohibited.
 - Open Source – no post sale use restrictions, no restrictions on modifications, some limits on resupply or on supply but aimed at preventing reversion to closed source.
- Open Source is successful because it creates a property regime for software.

Policy Considerations for Governments



- Copyright commercialisation tends to favour first movers and incumbents, seems to be a “winner take all” game in the long run
- If open source is able to
 - promote creation of software
 - gain or hold market share in face of closed source competitionis it the long term “take all” winner?

Closed Source Commercialisation



- Closed source commercialisation increases prices, decreases output
- US aggressively exporting this approach through WTO/ Bilateral FTAs.
- Is this disinterested altruism?

If Everyone Gets a Monopoly, surely that's fair?



- If everyone has the same entitlement to a monopoly, doesn't everyone receive the same benefit?
- If the rules of basketball are fair how come so many tall guys play?
- Developed Economy v Developing Economy (NB: different in kind from effects where property involved)

Closed Source Commercialisation



- Transfer of consumer surplus to one player in market – usu foreign firm = export of value
- Software typically sold in set bundles. Limited scope for value add or value add is in low skill areas
- “Look but don't touch” - foreign firms may enter country, but rules of the IP game mean they take technology with them if they leave – Branch economy.
- IT destiny/security in hands of foreign firms

Export of Closed Source Method



- Copyright and closed source commercialisation protectionist in effect (benefit to those countries with market incumbents)
- US economy big enough to bear protectionist millstone
- Imposition limits expansion of IT based industries in developing economies – esp where Government encourages closed source commercialisation/ Government commercialises own outputs as closed source
- Are developing nations which play the closed source game cutting their own technology throats?
- If no likelihood of incumbency by a local firm, is it appropriate to promote closed source commercialisation by local firms?

IP Commercialisation - The Lock In Paradigm



- Cornerstone of most copyright rhetoric
- Dead Content Model
- Copyright specifically structured to create product level monopolies – ie to enable vendors to lock in customers/government in respect of a product.
- Vendors derive clear benefits from the lock in paradigm – permits them to extract above market profits
- Mindlessly adopted by customers/government – customers typically have no interest in lock in. Lock in is typically against a customer's interest. (Almost all government IP “commercialisation” policies are directly against the interests of government)
- Need to think differently when Customer is funding development and assuming speculative risk.

Open Source Commercialisation



- Results in greater leverage from development dollar (more code per \$ spent)
- No restriction on modification, reuse.
- More in the nature of toolsets provision, therefore more opportunity for value add.
- Greater opportunity to localise spend (ie engage local developers)
- Promotes skills development, skills transfer, technology transfer
- IT Destiny/security may be owned locally – Red Flag Linux, Asianux

Policy – Govt Commercialisation



- Government funds software development
- Closed source commercialisation =>
 - profit returned (but possibly none, or loss)
 - at expense of penetration
 - requires ongoing commitment
 - all value can be lost
- Open source commercialisation
 - zero licence fee => optimum penetration;
 - ongoing commitment is optional
 - immune from vendor insolvency
 - enables “invisible hand” of market to work its magic
 - may return a profit

Thank You



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References

The following papers:

TCO: Why Free Software's Long Run TCO Must be Lower

Policy: Four Free Software Fallacies

The term “Lock in”: Lock in Software

Access Regimes and Govt: Draft Software Access Regime White
Paper

Available from:

<http://www.opensourcelaw.biz/publications>