Article

*165 PIRACY, PRICE DISCRIMINATION, AND DEVELOPMENT: THE SOFTWARE SECTOR IN
EASTERN EUROPE AND OTHER EMERGING MARKETS

Catalin Cosovanu [FNa1]

*167 I. INTRODUCTION

According to the latest study commissioned by the Software and Information Industry Association ("SIIA"), Central and Eastern Europe have the highest software piracy rate of any region in the world. [FN1] At the same time, many business analyses have touted information technology as an area with a great potential for growth that could help the countries of this region jump some developmental stages and reduce the current economic gap that separates them from the developed countries. Can this potential come to fruition in an environment where the infringement of intellectual property rights ("IPRs") remains so widespread in the very sector that should drive this new economic development? What are the relationships between the protection of IPRs, the local software industry, and the wider dissemination and access to information technology? Are there alternative, economic methods to combat piracy without hurting the transfer and diffusion of this technology, and, if so, why aren't these methods currently used? Finally, if the status quo proves to be more stable than expected, what potential new problems may arise in the future, and what could be the solutions?

This article will begin by making the case that because of the economics of software development and the nature of the market segments for different categories of computer programs, IPRs (copyright in particular) are practically irrelevant as an incentive for domestic software development in these countries and emerging markets in general, as the often cited example of India will illustrate. Moreover, this situation is unlikely to change soon. Hence, the only effect that the current strategy against piracy (i.e., heavy-handed policing while maintaining uniformly high prices irrespective of the local purchasing power) is likely to achieve is diminishing the diffusion of software technology in developing countries. This effect can ***168** be particularly negative because most of the economic benefits of the information technology ("IT") revolution do not come from the IT industry alone, but from the boost in productivity and flexibility throughout the economy resulting from the use of software tools, irrespective of their domestic or international origin. Therefore, I will explore the pros and cons of using a strategy based on price discrimination, that is differential pricing adapted to the conditions of the local market. [FN2] This strategy would allow sellers to recoup at least the marginal cost (the research and development investments being recovered in the developed countries as it currently happens anyway) while moving customers out of the black market of pirated software without blocking the diffusion of technology.

Considering these potential benefits, the absence of differential pricing in the software markets is rather puzzling, especially when compared to other IPR- reliant sectors, such as the pharmaceutical industry. This article will try to determine the main factors that have determined this absence. First, this article surveys what the legal and economics literature on this topic tends to regard as the "usual suspect," parallel trade. Next, this article argues that there are other economic and political reasons that actually make the status quo sufficiently comfortable both for the software producers and for the governments of this region and developing countries in general. Nevertheless, there are technological and cultural developments that may seriously disturb this comfort in the not too distant future, so this article will also examine the open source alternative and the solutions it proposes for emerging markets, as well as the problems it faces there.

*169 There are two main sets of sources on which I rely in my analysis. First, I rely upon the economic and technological indicators provided by the EU Commission's European Survey of Information Society Projects and Actions, [FN3] the European Information Technology Observatory ("EITO"), [FN4] the U.S. National Science Board, [FN5] and the Organization for Economic Cooperation and Development ("OECD") Information Technology Outlook 2000. [FN6] Second, I use the interviews I conducted in 2000 and 2001 as follows: in Romania with leading representatives of the domestic software industry, [FN7] ***170** directors of executive agencies and state research institutes [FN8] concerned with the elaboration of information technology related policies, members of Parliament who have authored the proposals providing a legal framework for the new technologies, [FN9] and local representatives of the Business Software Alliance ("BSA"), [FN10] an international group which represents large software firms such as Microsoft, Symantec, and Adobe on intellectual property issues; in January, 2001 with Microsoft anti-piracy managers in the region; [FN11] and, in the summer of 2001 in Hungary and Romania, with BSA and Microsoft representatives, [FN12] as well as the director and deputy director of the ***171** Romanian state agency for copyright protection ("ORDA"). [FN13] I also conducted interviews in Silicon Valley, with René Bonvanie, Marketing Vice President of Oracle; [FN14] Bradford L. Smith, Deputy General Counsel of Microsoft; [FN15] and U.S. investors in the Romanian software industry, such as George Roth, CEO of Recognos. [FN16]

The article is organized as follows. Section II examines the structure of the local software industry, its different products and

markets, and the implications of this structure with respect to the local industry's interest in IPRs or lack thereof. Section III is dedicated to the critical issue of software technology diffusion, the problems it faces, and the possible solution of differential pricing. Section IV looks at parallel trade as a potential problem for a price discrimination strategy, considers its pros and cons, and then argues that besides the less-than-perfect legal obstacles there are efficient technological barriers that can generally prevent parallel imports of software packages. Sections V explores the economic and political factors that have actually maintained the status quo of generally uniform pricing, and the implications for the future. Finally, section VI looks at the alternative of open source software.

*172 II. THE SOFTWARE INDUSTRY AND ITS MARKETS

One of the conclusions suggested by the meetings I had in Central and Eastern Europe was that the evolution of the intellectual property regime for software in the past few years has been mostly a "foreign affair." The managers of local companies have generally expressed little if any interest. The legislation has been to a significant extent imported, while BSA has become the most active promoter of enforcement. [FN17] Given the high international profile gained by intellectual property issues, the state agencies have been playing along. At the same time, under the severe budgetary constraints of transition economics, there is almost no room for sector-specific development policies. [FN18] The budgets for research are on a declining slope. In Romania, for instance, "by the mid-1990s the total budget for R&D on electronics, higher education, telecommunications, and IT and computing applications, was less than U.S.$20m. Of this, less than U.S.$1m was allocated specifically for informatics R&D." [FN19] Looking from a regional perspective, the picture of the software industry does not look much ***173** brighter [FN20] than the one of stagnant technological development in general. [FN21] The last decade has witnessed "a loss of software technological capabilities through both external and internal brain drains, through the conversion of some software developers into software traders, and through the conversion of some software custom-builders into software customisers." [FN22]

It is not surprising that local software developers would express only limited interest in IPRs in general (with the exception of trade secrets in the case of some firms doing offshore software development for Western companies), and copyright in particular (i.e., precisely the type of intellectual property right infringed through software piracy). [FN23] Their position has very ***174** much to do with the distinctions between different categories of software products and their respective markets. "Software is really a variety of disparate activities lumped together under the same rubric. Leaving aside packaged software, a business that is almost impossible to break into unless a company starts with major marketing clout in the United States, the custom side of the business ranges from routine code writing, which is a low-return use of skilled intellectual labor, to the design and implementation of complex information systems ...." [FN24] Copyright protection is relevant for the products that are pirated, i.e., for off-the-shelf, packaged software, [FN25] but the "network externalities", as well as other obstacles detailed further below in this section, make the barriers to entry in this market too high. [FN26] The software industry in Central and Eastern Europe works mostly on the "custom side of the business," to use Evans's expression, where products are generally not a target of piracy, not to mention that much of these products are for Western corporate customers ***175** outsourcing their programming needs and not for the local market. [FN27] In other words, where copyright matters, the Eastern Europeans are not present, and where they are present, local copyright protection is not really relevant.

This point is particularly important because, to my knowledge, practically all the analysts who have examined the relationship between software industry development and IPRs have failed to consider thoroughly the important distinctions between different sectors of this industry with respect to their sensitivity to intellectual property protection, and to copyright in particular. Below is a more rigorous substantiation of the points raised above.

A. Piracy Is About Packaged Software

In developing countries, piracy affects essentially only one category of software products, albeit the most visible by far for the general public (i.e., off-the-shelf, packaged software, [FN28] and within this category it is mostly the general applications (e.g., text processing, spreadsheets, basic graphics packages, etc.) that are targeted). The reasons for this are fairly obvious: (1) the size of the market in terms of the number of customers (there are many more potential clients for general packages than for niche applications, not to mention customized software); (2) the channels of distribution (with the type of mobile street stand commonly used by pirates it is practically impossible to reach specific clients); and, (3) the mobility and especially the anonymity (these traits required by illegal distribution are easier to achieve for both pirates and their customers when the counterfeit products are sold ***176** by practically all unlicensed distributors and used by more than 90% of the clients. [FN29]

At the same time, outside the sector of general off-the-shelf computer programs, there are several other products and services provided by the software industry that are not affected by the piracy taking place in the producing country.

B. Local Software Producers Are Not in the Sector Affected by Piracy

With some narrow exceptions, the software industry in Central and Eastern Europe is practically absent from the packaged sector. As the 1999 EITO study concluded, the main categories of activity in this geographical area are: "(1) custom software development, (2) localization, (3) body shopping, [FN30] (4) professional services [ranging from software maintenance to some technical consulting], and (5) packaged application solution development." [FN31] The same study noted the absence of "any kind of long term development of local packaged applications." [FN32] This situation is not particular to post-communist Europe. It appears as a common characteristic among the developing countries, including even India, the country that has **177** experienced the most impressive growth in this area. [FN33] Thus, with respect to off-the- shelf, packaged products, "no Indian software firm has yet introduced a significant software product." [FN34] While India has indeed earned "a substantial place in the world software industry," [FN35] its activities are still concentrated in customized software, IT services, and a tremendous amount of "writing code on contract," outsourcing for firms from Western countries, [FN36] a pattern which is very similar to Eastern Europe.

An important clarification is necessary here. What the aforementioned studies have found is not that firms from developing countries are absent from every stage in the development of packaged software products. The point is that, first, these firms by and large do not develop their own off-the-shelf products [FN37] (with some exceptions, generally targeting narrow, niche markets), [FN38] and second, they do participate in the **178** development of Western firms' packages, but at rather low technical levels. [FN39] Unfortunately, this "division of labor" in software fits with the bigger picture of high technology research and development in general, which remains overwhelmingly concentrated in the West, especially in the United States. [FN40] Moreover, there is no trend suggesting an increase in overseas research and development spending. With respect to the United States, the most recent data from the National Science Board actually shows a "re-concentration" of investments in high technologies: "strong growth in U.S. companies' domestic R&D financing (up to 10%), coupled with a 7% decline in industry's overseas R&D spending, reduced the overseas share to 8.9% of U.S. companies' funding total." Out of this already small amount, developing countries capture only a marginal 6%. [FN41] Looking specifically at software, the situation is described in the OECD Information Technology Outlook as follows:

With very few exceptions, work outsourced does not involve the development of mission-critical applications, nor do projects involve very sophisticated technology. Often firms outsource work considered routine or uninteresting by their IT professionals ....

... From a life-cycle perspective, systems requirements, high-level design, and installation and testing **179** are typically not outsourced, while low level design, coding, and post-installation maintenance (of older systems) are. [FN42]

Clearly, the local protection of copyright is practically irrelevant for the latter, low level activities, which are only a relatively marginal part in the development of products that are targeting mostly Western markets. This is even more so when the outsourcing of programming needs for Western companies takes the form of "body-shopping." Following are two illustrations described by the CEO of an American software company that has invested in Romania. [FN43] In the first case:

[B]usinesses are using the "Romanian bodies" to develop code in Romania. This type of business, which resembles the "sweat shops" of the textile industry, use [sic] the Romanians to do jobs that the people in the foreign countries don't want to do or are much more expensive .... The main characteristics of these are that the activities are "no-brainers", offer a [sic] very little professional challenge and satisfaction to the workers. These businesses are using only one aspect of the Romanian personnel and companies: they are much cheaper. [FN44]

In the second business model:

[T]hese types of business are mainly looking to hire people to be sent in other countries like Germany, Holland, US, etc. The people are interviewed and "exported" to these countries where they will be paid under the local salaries .... **180** [T]he foreign company will use the programmers for the duration of the temporary visas, paying these people much less than the local average salaries. This business is very profitable for the foreign companies, not profitable for the Romanian economy (there are no taxes when a body is exported) .... This business has also an "illegal" version. The illegal version happens when the foreign companies are bringing illegally workers from Romania, who go abroad as tourists or with business visas and stay in the foreign country for a long time working illegally and being paid much less than the local rates. [FN45]

Overall, this international division of labor in the software industry has been characterized by an Indian executive as follows: "It's the old story. We are exporting cotton and buying back the finished cloth." [FN46] This has many serious implications,

[FN47] but with respect to this article the important point is that the software industry in Eastern Europe and most developing countries is working in sectors where the local level of copyright protection is practically irrelevant.

C. No Foreseeable Change

One possible counter-point to the previous argument could be that developing countries should invest in building strong protections for intellectual property rights in computer programs with the hope that in the future they could move into sectors such as packaged software where IPRs ***181** do matter. I reply to this argument in this subsection: there are tremendous, lasting obstacles, not related to the protection of IPRs, that prevent most software firms in the developing countries from moving into the more lucrative business of developing their own packaged products on a sufficiently large scale.

1. The Network Effect

The first and most important of these obstacles is the "network effect" (or "network externalities" as economists call it) that looms large over IT. [FN48] This effect is particularly strong with respect to packaged computer programs, which, to use Katz and Shapiro's definition, are "products for which the utility that a user derives from consumption of the good increases with the number of other agents consuming the good." [FN49] There are many economic, social, and technological aspects involved in this relentless and mostly self- propagating effect, yet one can illustrate it simply with a typical example: "If everybody you know uses Microsoft Word, then you will find life easier if you use it too." [FN50]

Related to the network effect is the lock-in effect on consumers. "Once a customer has learned how to use a computer program, ... he is loth [sic] to switch because of the hassle of learning a new program. Users gain big benefits from common standards, so a newcomer has to show a huge ***182** advantage to persuade consumers to switch." [FN51] With a few narrow exceptions, developing countries are newcomers almost by definition in the packaged software market, although Central and Eastern Europe have had a rather long experience in developing complex custom software. Moreover, because the network effect is global in scope, the software firms in these countries that try to develop their own packages would have to face this problem even in their domestic market: "Imported packages have that market wrapped up, and entry barriers for local firms remain formidable." [FN52]

This situation is not limited to Eastern Europe. For example, many companies in India have tried developing off-the-shelf products as an entry strategy, but sooner or later either switched their business model to outsourcing, customization, technical consulting and other services, or at least included these activities as a substantial part of their business and the main revenue source. [FN53] Even the outstanding and rapidly growing global presence of India in other sectors of the software industry was not enough to help its firms break through the high entry barriers generated by the network effect in the packaged computer programs market. [FN54]

2. High Costs

Even if there were no network effect to overcome, there is a second major obstacle to consider. It is very expensive to develop a high quality software package and launch it successfully. [FN55] Despite lower wages for local programmers, these costs can still be prohibitive in an economic context where domestic capital is scarce and foreign capital has consistently ***183** preferred the less risky outsourcing model. Moreover, financing is particularly difficult to find in a conservative banking environment for a type of business that has little collateral to show. Once again, a comparison with India suggests that this is a common problem for most developing economies, [FN56] although there are variations of degree.

3. Telecommunications Infrastructure

Many authors have mentioned this obstacle, and its significance is fairly obvious in an IT context. [FN57] There is clearly a lack of a reliable and extensive telecommunications infrastructure in Central and Eastern Europe. The European Survey of Information Society presents their situation in detail. [FN58] Suffice it to say that the problem begins from the very basics, i.e., the level of telephone lines penetration, and goes up to basic Internet access, not to mention broadband access. [FN59] For instance, whereas the EU average ***184** at the end of 1999 was 94 phone lines per 100 inhabitants, [FN60] the Central and Eastern European average (excluding the former Soviet Union, where the number is even lower) was 38.1 lines per 100 inhabitants. [FN61] As for Internet penetration, in 1999 it was almost 5 times lower than the EU average. [FN62]

This barrier is becoming increasingly important in a technological context where network-based applications themselves

appear ever more important, and even Microsoft, the giant that made its fortune providing software for individual PCs and failed to grasp at the beginning the full technological and economic significance of the Internet, is now focusing its long term plans on the .net platform. [FN63]

4. Size of Local Market

Another obstacle to the successful move of Central and Eastern Europeans into packaged software development concerns the small size of their own markets. Domestic markets remain significant even in our "globalized" world.
First, a sizeable and demanding domestic market can be the springboard from which to launch into exports by providing ***185** a base of relevant skills, experience, user feedback on products, and track record. Second, a sizeable domestic market will draw large numbers of IT multinationals into collaborative relationships with local partners in order to serve that market. As these relationships deepen, an export component often emerges. [FN64]

Unfortunately, all the non-OECD countries taken together (including the "East-Asian tigers") represent an astonishingly low 6% share of the global software market. [FN65] Looking specifically at Central and Eastern Europe, its total information and communications technology ("ICT") expenditure in 1998 was 22.4 billion ECU (out of which only a meager 3.5% was spent on software) compared to Europe's total of 437 billion ECU and the U.S.'s ICT spending of $518 billion. [FN66]

It has been argued that piracy itself is the cause of this small market. [FN67] This may appear logical, but only if we assumed that those who use pirated software would be able to purchase legally distributed products at the current prices (more details on pricing and average wages are presented in the next section). Yet such an assumption would require a considerable stretch of imagination in countries where the purchasing power is ten to twenty times lower than in the United States or the EU. [FN68] In other ***186** words, even if copyright would be perfectly protected, these markets would still be small. [FN69]

The size of the domestic markets as determined by the low purchasing power is also pertinent to the argument made in this section, namely, the limited relevance of copyright for the local software developers, from another perspective. Even if local software firms were able to overcome the tremendous obstacles presented above and become significant players in the off-the-shelf sector, they would need to target mostly the developed countries, which comprise the bulk (over 95%) [FN70] of the global market. As producers of packaged proprietary computer programs, software firms in developing countries would obviously care about copyright protection. However, their concern would be naturally focused on where the main stream of revenue comes from, and in most cases that would not be the local market.

To sum up, this section has first pointed out that the relevance of IPRs protection in general, and of copyright in particular, varies significantly across different software industry sectors and markets. Second, local companies in Central and Eastern Europe and in developing countries in general, as the examples from India illustrated, are mostly absent from the off-the-shelf, packaged computer programs sector where copyright matters most, except as outsourcing firms providing inputs at a generally low technological level for Western packages. Third, there are tremendous and lasting non-IPR related obstacles that prevent software firms in developing countries from entering the off-the-shelf market at a significant level, at least for the short and medium term. Therefore, the benefits of copyright as an ***187** incentive to innovate are very limited in this particular area, and the only significant effect of stronger IPRs protection is the higher cost of packaged software products. This means a more limited diffusion of this technology because of the low local purchasing power, if prices are maintained high over marginal costs. Such a barrier to technology transfer can pose a serious problem, and the next sections will explore this issue and the possibility of using price discrimination as a solution.

III. COPYING VS. REINVENTING THE WHEEL: PRICE DISCRIMINATION AS AN INSTRUMENT OF TECHNOLOGY TRANSFER?
"[H]istorically, the biggest gains from a new technology have come not from its invention and production, but from its exploitation." [FN71]

Information technology production accounts for only 7% of the U.S.'s gross domestic product ("GDP"), 6.5% of Japan's and 4% of Europe's. [FN72] Much of the dramatic development that has made us talk of an "IT revolution" in the past few years actually reflects the impact of the use of the new technologies, which has increased productivity throughout the economies of the developed countries. [FN73] This point emphasizes how ***188** important it is for developing countries to benefit from the diffusion of IT. Unfortunately, many of these countries have been on a declining slope so far, the global "digital divide" leading to an even wider economic divide: [FN74] "the spread of information technology across all types of industries and services in industrialized countries is so fast and pervasive, with consequent improvements in price competitiveness, design,

and quality of products, that developing countries find it increasingly difficult to compete internationally." [FN75] As Jeffrey Sachs has emphasized, "[a]t the core of the global divide is the vast inequality in innovation and diffusion of technology." [FN76] At the same time, as the previous section argued with respect to packaged software, strong IPRs can end up being a costly barrier to this technology diffusion without providing the benefit of boosting local innovation and production.

*189 The solution might be price discrimination. For software, just like for many other information intensive products, the marginal cost of making and distributing additional units is very low. The large research and development expenses are recouped in the developed countries' markets. However, one cannot reasonably expect to distribute large quantities at the same price in markets where the purchasing power is ten or twenty times lower. [FN77] Given the economic conditions, the incentives to disregard intellectual property rights are much greater for most people, as the choice is not just between a free ride and a paid, yet affordable ride, but between a free ride and none at all.

What the heavy-handed enforcement of IPRs in these conditions can achieve is not a substantial increase in legitimate sales, but less access to the technology. However, selling instead at a lower price that reflects the marginal costs and the local purchasing power could displace even the most resilient pirates [FN78] without hurting diffusion, while enhancing the legitimacy of IPRs in the process. [FN79] Besides, the new "discount clients" would be ***190** encouraged in this way to abandon the black market for the legal one. Furthermore, unlike physical goods, for informational products "familiarity has more value than scarcity," [FN80] and, in this respect, a policy exclusively focused on prohibition can be economically counterproductive in the long run.

This specific argument is related to broader development issues. A large part of the development of economics literature has been dedicated to finding ways to foster domestic technological innovation. [FN81] This is certainly commendable, but as the previous section has shown, there are certain sectors where the obstacles are tremendous, at least in the medium term. Copying may be less glamorous than creating anew, but there are areas where "the comparative advantage of emerging economies lies in applying new technology developed in rich economies, not trying to invent it." [FN82] Otherwise, it is the old story of wasting scarce resources on reinventing the wheel. [FN83]

This point also relates to the idea of nourishing the crucially important, yet often forgotten, demand side of development and not just the ***191** supply. [FN84] "Unless a demand side can be cultivated that appreciates and exploits sophisticated and advancing technology, economic growth can slow or, ultimately, fail to continue." [FN85] The most important factor in this respect is obviously the system of education, but having real (i.e., economically affordable) access to the technology is also key. Concerning access to software, it can literally mark the level of computer literacy. The following example is chosen from the education system itself:
"We have no money," says Alexander Ostroumov, a professor of applied mathematics at Moscow State University. After purchasing a CD-ROM tutorial on an advanced programming language for $5 (which legally retails for $400), he said, "This is the only way to study it (the language), this is the only way to learn. Many of the colleagues I worked with, some of them University professors, are attempting to live on $100-200 a month salary!" [FN86]

Unfortunately, this is a generalized problem. To illustrate it with some of the most popular computer programs, the table below lists the prices for the ***192** legally distributed Romanian versions of the Microsoft Office suite, the Windows 98 operating system, and the Visual Basic software development tool.

Prices for Selected Romanian Software ($) [FN87]

Office Pro 2000 Win32 Romanian CD	365
Office Pro 2000 Win32 Romanian CVUP CD	213
Windows 98 Romanian OLP Com	146
Windows 98 Romanian OLP NL Com	146
VB Pro 6.0 Win32 Romanian CD	548
VB Ent 6.0 Win32 Romanian CD	1,315

These prices are fairly similar across Central and Eastern Europe. For example, the Russian version of Microsoft Office was slightly more expensive at $396, while the Academic Edition of the program was a little cheaper at $116 ,and the price for Windows 98 was practically the same as the Romanian version, at $148. [FN88] These prices are also similar to those charged in the United States, as verified at Stanford Bookstore, as well as at on-line stores such as http://www.egghead.com.

Moreover, Microsoft is not an exception in this respect. Looking at the prices for software packages produced by other major companies, for example Adobe's graphics software, the same similarity appears between ***193** the pricing structure in Western countries and in Eastern Europe, [FN89] as well as other developing countries such as China. [FN90] Ironically, sometimes prices are even higher in the developing countries. [FN91]

The problem is, as the table below proves, that the purchasing power in Central and Eastern Europe is much lower than in the United States, [FN92] the European Union, [FN93] or Japan, [FN94] and therefore, the "choice" for the vast majority of prospective users is between pirated software and no software:

*194 Average monthly wage ($) [FN95]

Country	1998	1999
Bulgaria	106.5	107.3
Czech Rep	362.1	366.0
Estonia	293.1	324.3
Hungary	316.0	326.6
Latvia	225.9	246.2
Lithuania	288.1	280.8
Poland	355.2	429.9
Romania	153.0	127.7
Russia	108.3	64.3
Slovakia	283.9	260.9
Ukraine	67.2	44.4

The average monthly wage concerns individual users, but it is a good proxy for purchasing power in general. Most firms are affected as well, especially the small and medium size enterprises. An American IT investor in Romania has raised a related interesting point about affordability:
It is easy to say that if a company can afford a computer then they can afford the software, but it is not always the case in an economy such as Romania. A computer can be bought for $600 but the average user requires a further $600 for software, which is like saying that if a driver can afford a Ford he can afford a Mercedes! [FN96]

*195 Considering the much higher price sensitivity that results from the wide discrepancy in purchasing power, as well as the low marginal costs for off-the-shelf software packages (as opposed to, for instance, hardware), the absence of price discrimination appears counter-intuitive. The following two sections explore this puzzle and its possible answers, beginning with the pros and cons of price discrimination in the broader context of the parallel imports [FN97] debate, and then looking at the specific legal, technical, and economic issues involved.

IV. PRICE DISCRIMINATION VS. PARALLEL IMPORTS

"If we were to sell our software at a much lower price in Romania, it would be bought wholesale and next week we would see it resurface in Germany." [FN98] This illustrates the typical first answer I received (during interviews with representatives of BSA and legal software distributors) to my inquiry about why prices are generally so similar across markets that **196** differ so much on purchasing power. This fear of potential parallel imports [FN99] is hardly surprising looking from the perspective of the economics and legal literature on price discrimination (although, as the following subsections will show, the empirical reality actually tells a fairly different story). This perspective unanimously considers unrestricted parallel trade as the main obstacle to differential pricing between national markets, [FN100] because parallel imports would defeat a price discrimination strategy by "arbitraging away the premium in the most expensive market." [FN101] What is interesting to note is that in the price discrimination vs. parallel imports debate, the authors who are skeptical about the benefits of IPRs in developing countries also tend to be on the side of international exhaustion. [FN102] International **197** exhaustion allows parallel imports, [FN103] notwithstanding the technology transfer problems that can be generated by similar prices. Moreover, developing countries have generally favored international exhaustion, while developed countries have been mostly on the side of territorial (i.e., either national or regional, e.g., European Union wide) exhaustion. [FN104]

One of the main arguments brought forward by the supporters of parallel trade is that:
territorial exhaustion may undermine export-based economic development strategies of developing countries and countries undergoing transition to market economy. Since under territorial exhaustion, [intellectual property] title-holders would be entitled to invoke their exclusive rights to **198** protect their home markets from parallel imports, this would mean that whenever a developing country or a country in transition relies on foreign technology for its domestic development, it would be restricted in its choice of export markets since quantitative restrictions ... may be replaced by protective intellectual property measures having an equivalent effect. [FN105]

International exhaustion proponents also claimed that parallel trade would serve as a pro-competitive instrument in the global markets. [FN106] Frederick Abbott has tried to apply this argument to the software industry: "It remains to be explained why software developers should not be required to face price competition in international markets ..., and to charge a price that allows them a reasonable rate of return across all markets, even if this means reducing prices in developed country markets." [FN107] Unfortunately, the explanation demanded by Abbott is simple. First, in the key sector of packaged software there is virtually no competition (on price or anything else) from the developing world, and, as the previous section has shown, no significant competitor is likely to emerge in the foreseeable future, at least not within the proprietary software development model. Second, because **199** of the huge income discrepancies, it is practically impossible to find a "price that allows ... a reasonable rate of return across all markets." [FN108]

The arguments of the opponents of parallel trade (and hence of international exhaustion) that are most relevant for this article concern precisely the price as well as the availability of IP goods: "[I]f parallel importation is allowed and the manufacturer sets a uniform price to maximize his joint profits, consumers in the country with the higher price elasticity [i.e., the developing nation] are harmed as prices are raised. A uniform international price may make it uneconomic to even supply low-income countries." [FN109] In fact, one can find illustrations of this problem even between developed countries with different income levels. For example, the adoption of regional exhaustion in the European Union led to an increase in the price of pharmaceuticals in poorer EU countries, and even made some of these products unavailable. [FN110] Fortunately, the income disparities within the EU are relatively small (compared to the global North-South and East-West gaps), [FN111] so the impact in this case was fairly limited, yet sufficiently significant to indicate that the problem of gaining access to affordable IP-**200** related products when parallel trade is permitted is very real. [FN112] The solution suggested by some of the proponents of international exhaustion is compulsory licensing. [FN113] This may work for patents in the politically sensitive area of health care, considering TRIPS' relatively more "generous" provisions in this respect, [FN114] but it would be much more difficult to impose a compulsory license for copyrighted products. [FN115]

Besides the studies focused on the pharmaceutical industry, the empirical evidence on the issues raised by the parallel imports vs. price discrimination debate is scarce. [FN116] There is, however, a body of theoretical literature that has approached these issues through economic models and has generally concluded that price discrimination is welfare enhancing both globally and for the developing countries (again, the key benefit for the latter being the access to technology at a lower price). [FN117] The supporters of parallel trade have criticized this literature for its "simplifying **201** assumptions," [FN118] but, to my knowledge, have failed so far to propose alternative models.

This brief review of the arguments and their flaws in the price discrimination vs. parallel imports debate suggests, first, that if the primary concern with regard to technological and economic development were the access to foreign technology, such as

software for developing countries, then the ability to price discriminate between national markets with different income levels would be essential; and, second, that differential pricing requires a reliable set of barriers against parallel imports. Therefore, the following two subsections will examine the legal and, with respect to computer programs, technological means that can be employed for this purpose.

A. Parallel Imports: The Legal Barrier

The result of the international debate over the exhaustion of IPRs and parallel imports has been an "agreement to disagree," reflected by Article 6 of TRIPS: "subject to the provisions of Articles 3 and 4 [FN119] above nothing in this Agreement shall be used to address the issue of the exhaustion of intellectual property rights." [FN120] The 1996 WIPO Copyright Treaty is similarly inconclusive in this regard. [FN121] Considering that the relevant international treaties neither prohibit nor expressly allow parallel imports, the presence and extent of possible legal barriers to such imports are, for the time being, ***202** defined solely by the national (or regional, e.g., EU) law of the countries which are the destinations of parallel trade.

The countries of the European Union are the most likely first targets for parallel imports coming from Central and Eastern Europe. Based on Articles 30, 36, [FN122] and 222 of the European Economic Community Treaty, [FN123] the European Court of Justice ("ECJ") has established the principle of regional exhaustion: A first sale of an IP good in any of the member countries exhausts the distribution rights over that good throughout the EU. [FN124] At the same time, parallel imports from outside the European Union are prohibited, even when they originate from countries that are in a free trade agreement with the EU (as is the case for several Central and Eastern European countries), as demonstrated in the Polydor v. Harlequin Record Shops case. [FN125]

*203 Turning to the United States, while its representatives have taken a very clear position against parallel imports during the TRIPS negotiations, compared to the more ambiguous viewpoint adopted by some of the governments of EU countries, the positions of the U.S. courts and their interpretation of the relevant statutes on this issue are more nuanced.

In the 1998 Supreme Court ruling in the L'Anza case, [FN126] a provision in Section 602(a) of the Copyright Act prohibiting "importation into the United States, without the authority of the owner of copyright" [FN127] was found to be limited by the first sale provision of Section 109(a). [FN128] In the decision, Justice John Paul Stevens wrote: "[t]he whole point of the first sale doctrine is that once the copyright owner places a copyrighted item in the stream of commerce by selling it, he has exhausted his exclusive statutory right to control its distribution." [FN129] However, to read L'Anza as a wholesale acceptance of parallel trade would be a mistake. As Justice Ruth Ginsburg noted in her concurring opinion: "[t]his case involves a 'round trip' journey, travel of the copies in question from the United States to places abroad, then back again. I join the Court's opinion recognizing that we do not today resolve cases in which the allegedly infringing imports were manufactured ***204** abroad." [FN130] And, as scholars have pointed out, there is a line of cases that "has construed Copyright Act § 109(a) to establish a rule of territorial exhaustion [i.e., parallel imports not allowed] with regard to goods manufactured outside of the United States." [FN131] As for patented products, the 2001 decision of the Court of Appeals for the Federal Circuit in the Jazz Photo case upheld the argument that parallel imports infringe U.S. patents and said "United States patent rights are not exhausted by products of foreign provenance. To invoke the protection of the first sale doctrine, the authorized first sale must have occurred under the United States patent." [FN132]

Finally, turning to the Japanese law on parallel imports, most commentators have found that, compared to the European Court of Justice and even the U.S. courts, the Japanese courts have generally taken a position that is more favorable to international exhaustion. [FN133] Most relevant is a 1997 ***205** ruling of the Japanese Supreme Court: "[t]he patentee is not permitted to enforce his patent right in Japan against ... third parties or subsequent purchasers ... except where the patentee has agreed with the (first) purchaser (to exclude Japan from the territories for sale or use) ... and has explicitly indicated the same on the patented product." [FN134]

Even if courts in the aforementioned developed countries tend to find parallel imports to be illegal (sometimes, as in Japan, only if there is also an agreement between parties prohibiting such imports), some goods might still trickle in if the difference of price between markets in developing and developed countries is worth the risks of smuggling. [FN135] Therefore, the next subsection will explore the self-help option for software producers: using technical means and product differentiation to prevent parallel imports.

B. Parallel Imports and Software: The Language Barrier

If a German user were able to save a couple hundred dollars on a software package by learning enough Romanian (or Bulgarian, Hungarian, Polish, etc.) to use the version with a Romanian language interface, would he or she invest the time and effort to learn the language? This is obviously a rhetorical question, considering that convenience is so important for the vast majority of non- technical users of general applications (e.g., text processing, spreadsheets, basic graphics packages, etc., precisely the typical targets of software piracy). [FN136] Unlike, say, pharmaceutical companies, producers of computer programs have the possibility to use a "natural" means of product differentiation that can be very effective against parallel imports: the language of the user interface (i.e., the language used in the **206** program menus and in the help files). [FN137] Moreover, as this subsection will argue, the technological implementation of this barrier can be achieved with very low extra costs.

For a price discrimination strategy relying on the language barrier to be feasible, the low cost of the technology involved is essential. As the next section will show, a competitive price in a developing country market would generally mean a very low price, but that would be practically impossible to achieve if the cost of localization for that market would be high. The key for avoiding such a high cost is using a flexible, modular software architecture where the resources (e.g., the strings/words used for the program menu, the graphics files used for icons, etc.) are properly separated from the code itself. [FN138] To paraphrase a Java slogan: internationalize once, localize everywhere. "What internationalization does mean is developing your product in a modular, extendible, and accessible way, so that when the need to localize for a particular market arises, the localization can be done as easily and cheaply as possible." [FN139] If this approach is adopted, the cost of internationalization for a software product **207** can be estimated at approximately 1% of the overall development cost, and localization remains essentially a matter of translating the words in the menu and the snippets of text for the help files and then replacing the appropriate language files, rather than "hard-coding" them in the core program code. [FN140]

Fortunately, general software applications are usually developed in this way, for the simple economic reason that their producers are trying to capture as many of the foreign markets as possible, while minimizing the costs of repeated localizations. For example, the structure of the often-pirated Microsoft Office package in this respect is presented as follows: "[l]anguage- specific features are stored separately, primarily in DLL files. These features 'plug into' the core Office 2000 code; users can install and run these features when they need them." [FN141] One point, already suggested by the quotation from Richard Ishida, needs to be emphasized. Most of the overall costs of adapting a computer program for different national markets are actually fixed costs concerning the internationalization of the program from the outset in order to make the marginal cost for each additional language minimal. Once the investment has been made to develop the **208** program based on an architecture that makes it easy to localize in, for example, French, Hebrew, or Japanese, it is very cheap to further localize in Polish, Arabic, or Chinese. The fixed costs of internationalization are recouped in the developed countries and only the very low marginal costs of localization remain to be covered in the developing countries' markets.

While the product differentiation through language is generally effective and its technological implementation is cheap, there is a caveat. In some very important cases, such as China, this barrier can be defeated by the presence of a fairly large population in one or more developed countries that also speaks the language of the developing country benefitting from price discrimination. For the software producers, this population represents an important pool of high price customers. There is the possibility of using legal provisions against the parallel imports targeting these customers, but as I showed in the previous subsection, this barrier is not impenetrable. Nevertheless, there are a large number of developing countries (including all of Central and Eastern Europe) where different languages in the user interfaces can effectively prevent parallel trading. In these numerous cases, the quote with which I started this section makes no sense. [FN142] The producers of software could price discriminate as much as they want without fearing the main problem touted by all the economic and legal literature on the topic: parallel imports. And yet, they do not. The explanation has to be found somewhere else.

V. PRICE DISCRIMINATION: REAL PROBLEMS, NO SOLUTION?

If parallel imports are less of a problem than expected with respect to software packages because of language differences and legal barriers, what could be the real reasons for the near absence of any meaningful price **209** discrimination, and are there any solutions? This section will begin by looking at the economic feasibility of a strategy based on low prices, taking into consideration the local purchasing power, the marginal costs, and, most importantly, the competition with the easily available sources of pirated copies. Very low prices would expand the market and drive out the pirates, [FN143] but would also risk losing revenue from the few customers that are currently paying the high prices. Another issue is the potential marketing backlash in the developed countries, making it more difficult to justify the high prices in the primary markets. [FN144] Considering these problems, as well as the insignificance of the developing countries as sources of revenue, software producers may simply (and inertially) find the status quo comfortable enough. The passivity of governments in developing

countries may also play a role, especially when compared with the situation in the pharmaceutical sector.

Nevertheless, there are at least two reasons why the status quo should feel less comfortable in the long run. The first concerns the development of better technological tools to control copying, either through software or even through elements embedded in hardware, effectively blocking the diffusion of technology that is currently achieved, albeit illegally, through piracy. If these tools turn out to be ineffective, we are left with a second, yet no less serious problem: the further development and ultimate entrenchment of a culture of piracy. [FN145]

*210 A. Price and Piracy

Considering the local purchasing power [FN146] and the average prices charged for a pirated CD-ROM, [FN147] competitive prices for legal software packages would actually have to be at least 95% lower than the prices currently charged. [FN148] Thus, prices would have to be very low to compete successfully with pirates and truly penetrate the local market.

There have been some periodic attempts to attract customers away from the black market by offering temporary markdowns that would count as deep discounts in most circumstances, e.g., 50%. The deepest markdown mentioned during my interviews was 75%. [FN149] However, the impact of these discounts in terms of higher legal sales was very limited. [FN150] As the Anti-Piracy Manager of Microsoft Romania, Viorel Apetrei, acknowledged that you cannot really compete with the pirates unless you offer prices that are close enough to those on the black market. [FN151]

Moreover, the problem is not only the very low prices on pirated software, but also its widespread availability, BSA and governmental efforts notwithstanding. For instance, when asked about the channels of distribution for the counterfeit CD-ROMs, the Anti-Piracy Manager for ***211** Microsoft Bulgaria, Teodor Todorov, answered: "[W]e have a serious problem named Slavejkov Square, where you can buy whatever illegal you wish. This place is in the center of Bulgaria's capital, Sofia." [FN152] This example is typical. While it is true that pirated software is usually not sold in stores anymore, small stands, which provide enough mobility for the sellers to avoid many police raids, are still present on many streets and squares, often in central areas of the cities, [FN153] and offer most of the general software applications, in addition to computer games, music, etc. Based on my own experience, it is often easier to get a computer program from such a stand than to find a legal source.

Some of the international channels that used to provide large quantities of counterfeit CD-ROMs in Central and Eastern Europe have been closed, but not all. Ukraine and Russia, for example, remain significant "exporters." [FN154] Besides, small local suppliers have taken advantage of the much cheaper copying technology available in recent years and have become the main source of pirated software, distributing it in the local language of the respective countries. [FN155] Moreover, "hard disk loading" [FN156] by local dealers of personal computers is estimated to occur in approximately ***212** 45% of total computer sales, [FN157] even though, presumably, this type of piracy should be easier to control.

Assuming that prices low enough to be competitive in such an environment were adopted, would they cover the marginal costs? There would be no problem covering the cost of the CD-ROMs and their inscription, a cost that amounts to less than 30 cents per copy. Pirates, after all, cover that and make a nice profit despite the small scale of most of their copying operations. [FN158] Two potentially serious issues were raised during one of the interviews: [FN159] high marketing costs and post-sale service costs. Upon closer examination, however, neither should actually be a problem. The widespread "success" of piracy in developing countries in the obvious absence of marketing (unless word of mouth could be included in that category and budgeted accordingly) indicates that in those markets "software sells itself," as one vendor put it. It would seem absurd to run expensive advertising campaigns, passing the costs into higher prices, only to be outsold by cheap pirated copies. As for post-sale service costs, a service contract could simply be offered separately from the software license, for the few purchasers who would be willing to pay for it. Again, pirated software sells very well without any service, just as it does without any marketing, and there is no practical reason why low-priced legal software should be different, not to mention that a licensed distributor is inherently more trustworthy to a customer than a street vendor of counterfeit copies.

For the software firms, the real problem with regard to the economic feasibility of a price discrimination strategy is that, although legal sales ***213** would most likely grow tremendously because customers would no longer have an incentive to buy pirated copies, the price would have to be cut so drastically that the higher number of licenses distributed legally might nevertheless fail to outweigh the loss of revenue from the few customers that are currently paying the high prices. It is true that the number of these customers is very small. It is not just individual users that purchase pirated copies rather than legal software because of the current unaffordable prices. The majority of small and medium size businesses also face a serious

affordability problem because of these prices, and therefore, they too rely on the black market. [FN160] No legal distributor has been willing to disclose the exact number of copies that they currently manage to license, but one can estimate a percentage relative to the total market by reference to the piracy rate. For instance, in the case of Romania, the market for legal software is evaluated at about 19% [FN161] of the combined (i.e., both legal and pirated) number of copies used in businesses. [FN162] This combined business market represents about 60% of the total (i.e., business plus individual users) software market. [FN163] Leaving aside the trivial number (less than 1%) of individual users who purchase legal software, [FN164] one can calculate the percentage of legally licensed software as 19% out of 60%, that is approximately 11% of the total number of copies on the market (i.e., including both the legal and pirated copies used by businesses and individual users). This means that, theoretically, there is room for the legal ***214** software market to grow approximately nine times. [FN165] At the same time, as I argued above, such a huge, unprecedented expansion would be possible only if prices would be cut by about 95% in order to be competitive with the pirates and fit the local purchasing power. As noted above, temporary discounts as deep as 75% did not work. Selling nine times more goods would indeed represent tremendous growth, but even such a growth at prices that are twenty times lower would still mean less revenue.

There are, however, two factors that can still tip the balance, considering that the current level of revenue from legal sales is very low to begin with. [FN166] First factor: there are a significant number of firms that have had to considerably reduce their IT investments, because on the one hand they could no longer avoid the legal risks posed by the increasing number of BSA and police raids and hence could not use cheap pirated software anymore, and on the other hand their local-size revenues could not sustain Western-size prices for legally purchasing the software they need. [FN167] If prices were to go down, these firms would represent a significant additional source of market growth for legal licenses of computer programs. [FN168]

The second factor that could make the reduced prices a viable financial proposition concerns the software producers' savings from cutting the costs of the anti-piracy campaigns they sponsor. The price competition from cheap legal copies of software would probably displace even the most resilient pirates. There would be no incentives for customers to continue buying pirated computer programs when legal licenses are available for similar prices. Therefore, the current anti-piracy effort could be drastically reduced, since it would no longer be necessary, and the software producers ***215** would save these costs. This economic strategy would likely succeed where so much lobbying for stricter laws and stronger enforcement, anti-piracy advertisement campaigns, BSA raids, and so on have failed to achieve more than limited success. [FN169]

Nevertheless, even though this strategy is logical and the scenario presented above is plausible, there are certainly no guarantees. So, considering that at least in the short and medium term revenue would at best stay the same in this scenario, [FN170] why would any company take the risk of changing the status quo? Bradford Smith confirmed in my interview that firms selling software packages in developing countries have been making such calculations, comparing the current stream of revenue from a few large corporate customers willing to pay a high price, with the revenue that could be generated by a larger customer base at much lower prices. [FN171] The conclusion was generally favorable to the status quo. "In developing countries, large businesses dominate the demand," Smith said. [FN172] Moreover, as shown below, there are additional reasons not to use price discrimination.

*216 B. Marketing Backlash Back Home?

Both René Bonvanie, Oracle's Vice President for Marketing, and Bradford Smith, Microsoft's General Counsel, pointed out in my interviews that one of the reasons why a software company would not charge a lower price in developing countries is that it would risk a marketing backlash in the home market. As they suggested, for companies that are producing general software applications, it is often difficult to explain the high prices to customers in developed countries. "If the same software package, maybe localized, would be sold for a very low price in developing countries, how could a company justify charging much more in its primary markets?" Bonvanie and Smith asked rhetorically. [FN173] However, only Bonvanie added: "better just give it away for free. This way you can at least get better public relations for the company." [FN174]

Even if this marketing backlash may turn out to be less serious, the developed countries markets are so much more important in terms of revenue for the software firms [FN175] that even a minor problem there would outweigh any benefit, however large, in the developing countries. Unfortunately, as demonstrated in the previous subsection, from the software producers' perspective the benefits of a price discrimination strategy would be small at best.

*217 C. Passive Governments

Another reason why software companies feel little need to shift to price discrimination is revealed by a comparison with the pharmaceutical industry. For medicines, international differential pricing is quite common. [FN176] Often, prices can be even ten times lower in developing countries. [FN177] As most analysts of parallel trade in pharmaceuticals agree, there is an important factor that drives these prices down in spite of the greater risk of parallel imports in this market: "countries achieve low pharmaceutical prices by aggressive regulation." [FN178] This factor is obviously missing with respect to computer programs.

Could (and should?) the governments of developing countries intervene to ensure legal access to proprietary software at affordable prices? Health care is a much more prominent political issue. One need not be an absolute cynic to note that it is easier, albeit not guaranteed, [FN179] to build a case for inexpensive access to certain IP-related products, based on the suffering of people crippled or even decimated by diseases, than on technological illiteracy, although the economic stagnation related to technological backwardness is one of the indirect factors that help cause the tremendous ***218** health care problems. [FN180] Governments of the developing countries, however, may actually feel, for the time being, sufficiently comfortable with the status quo. Notwithstanding all the political noise about fighting piracy, cheap counterfeit computer programs remain widely available to the majority of those who cannot afford licensed copies. [FN181] According to Bradford Smith more political pressure from developing countries to ensure technology access would likely increase if the supply of pirated software was seriously curtailed. [FN182]

D. The (Uneasy) Comfort of the Status Quo

"If it ain't broken, why fix it?" From the perspective of the developing countries, the technology transfer that could be achieved legally through price discrimination is accomplished by piracy. It is not a perfect instrument, there are numerous firms caught in the middle, too large to avoid the police and BSA raids and yet too small to afford the IT they need at Western prices. [FN183] Generally, though, it works, especially for individual users. From the perspective of the software producers, they get some revenue from the few that can afford the high prices. In the short run they would probably not make more money by lowering the prices enough to increase the number of customers. Moreover, the conventional wisdom that resulted from the interviews I conducted, with the obvious exception of the Microsoft and BSA managers, is that piracy creates a network effect for the dominant software packages, building a large captive user base and eliminating the risk that cheaper rival computer programs, proprietary or ***219** open source, would gather a significant following. Later, if the economy and the purchasing power grow to the point where the respective market can become a major source of revenue, a more vigorous anti-piracy campaign can be conducted. This is similar to the logic that applies at the level of local companies: it is not worth going after the "small fry."

Yet, there are two potential problems with this picture. First, although technology has generally facilitated copying so far, better control technologies may very well become the norm in a not too distant future, either implemented through software [FN184] or embedded in the hardware itself. [FN185] One of the implications would be that piracy could generally become almost impossible, and thus, the current main source of cheaper software will disappear. But, as the next section suggests, the positive side of this scenario is that it may finally lead to a major increase in the market share of open source software [FN186] to a point where it would become a widely used, affordable, and legal alternative eventually dethroning the currently dominant proprietary software packages.

Interestingly, however, Microsoft's General Counsel expressed skepticism regarding the feasibility of eliminating piracy through technology. "Somebody will hack the protection, disseminate the ***220** circumventing program, just like DeCSS, [FN187] and therefore counterfeit software will remain available." [FN188] Nevertheless, this alternative scenario, assuming the long-term continuation of piracy, is not without problems itself. The culture of piracy, which is already widespread, [FN189] would likely become truly entrenched, establishing the idea deep in the popular belief system that any intellectual product is "up for grabs." [FN190] Even more problematic will be the entrenchment of illegal distribution channels, fostering corruption and duplicity.

*221 VI. OPEN SOURCE SOFTWARE: A VIABLE ALTERNATIVE?
"Open Source is ... a way to empower developing countries." [FN191]

- Linus Torvalds

"Why should the masses bother with free software when stealing from Microsoft is practically patriotic?" [FN192]

- Jonah Greenberg

Given that price is such a central concern for the Central and Eastern European software market and for developing countries in general, as Section II has shown, why isn't there a significant move away from the expensive Windows monopoly and proprietary software packages in general to the legally free open source software, [FN193] such as the Linux operating system or the Open Office suite? This Section will try to answer this question, explore the circumstances that may determine a shift away from the status quo, and then search for the actors that could promote such a change.

Quite a few representatives of the open source movement have expressed optimism about the spread of free software into the developing *222 world. For instance, Miguel de Icaza, founder of the GNOME project, is "counting on wide acceptance outside the U.S., especially in developing countries that can't afford Microsoft products." [FN194] Similarly, John "Maddog" Hall said: "Because Linux is a low-cost alternative to other operating systems, I think there will be a lot of growth in what I call the emerging countries." [FN195] Some open source advocates, including those within "friendly" companies such as IBM, have suggested that we should expect a faster and wider spread outside Western countries for another important reason besides price. They claim proprietary systems and Windows in particular are not yet well established. Therefore, Kakutaro Kitashiro (president of IBM Asia-Pacific) argues that "developing countries are potentially more open to Linux if you move quickly." [FN196]

The problem is that currently the market looks very different from these open source optimistic accounts, both with respect to the real price of proprietary software, and the Microsoft monopoly and the corresponding network effect already working powerfully in its favor.

First, as I have shown in the previous section, very cheap pirated copies of proprietary software are still widely available in Eastern Europe, the efforts of BSA and local governments notwithstanding. This situation is common in most emerging markets. [FN197] Indeed, some of the more realistic free software advocates, with actual experience of doing on-the-ground *223 "open source evangelism" in developing countries, consider widespread piracy as one of the key obstacles to the spread of free software. [FN198]

Second, Microsoft's operating system and its main application suite have achieved an overwhelming market share of well over 90% among PC users [FN199] through, ironically, the wide diffusion of pirated copies. The network effect, described in Section II, is ensuring for the time being the stability of this market domination. The aforementioned open source optimists' point about Windows not being well established yet is wrong, because the "limited" use of Microsoft and other proprietary software simply reflects the much more limited use of computers in general. Among those who actually represent the market for IT, Microsoft has already established its monopoly, and, so far, the increase in PC sales has only brought more users into its fold. [FN200]

Convenience is also an important part of the story. "The problem here is that ordinary users don't buy operating systems. They buy computers. Linux users must commit themselves to a certain amount of tinkering and tweaking before they can settle in to work. Meanwhile you set up your brand new computer and find it already has ... Windows OS. [FN201] *224 If it ain't broke, why fix it?" [FN202] The consequences can be seen both in Central and Eastern Europe and in other developing countries. For instance:
Windows OS and Microsoft's localized software remain the most widespread, user-friendly and available software in the Chinese PC market, and most users are likely to stick with whatever is most convenient. Especially when they can get it from their neighborhood street merchant for next to nothing ... the Linux movement in China remains largely limited to small groups of bespectacled systems administrators and highly gifted computer users .... Very few Linux fans even seem to believe that it's their mission to promote open-source software among the mainstream computer users. [FN203]

Besides the fact that the Windows operating system and the applications written by Microsoft and other major companies on the Windows platform are still friendlier to the "non-techie" user, although not necessarily more reliable, another convenience factor (related to the aforementioned network effect) that has also hindered the spread of open source software is the larger number of end-user applications available for Windows than for Linux. [FN204]

Finally, one last barrier on the free software path is the conservative bias of many businesses and most state bureaucracies, sometimes even within the structure of agencies that are supposed to be on the cutting edge *225 of science and technology. [FN205] This problem is related to the issue of accountability. In the words of an "open source evangelist," this
issue isn't really about the vendor, it's about the buyer. While choosing Microsoft for a project that results in bursting budgets

and missed deadlines might be acceptable because 'everyone else does it that way,' one can't use that excuse when choosing Linux. In other words, at a certain level it's all about which operating system helps you cover your tracks better, regardless of which choice is in the better interests of the company. [FN206]

Unfortunately, "fear and inertia" are still more characteristic of the business environment in this respect than the readiness to make truly bold innovative changes as required by the open source model. [FN207]

Given these obstacles, under what circumstances should we expect to see a major increase in the use of open source software in developing countries? One strong push in this direction would likely (and very ironically) come from a more effective crack down on piracy, especially if coupled with the use of better technological tools for prevention, because this would cut the access to the current main source of affordable software. As an open source advocate put it: "I wish commercial vendors would step up their efforts to curtail piracy ... because the more that consumers are ***226** forced to confront the real cost of proprietary commercial software, the more they'll be encouraged to look at free software and other open alternatives." [FN208]

Security concerns about hidden access for inimical countries or commercial competitors through back doors implemented in the closed source code of proprietary software packages also tend to tip the balance in favor of free software, precisely because its source code is open. China, for instance, has been vocal about its concern over the alleged back door in Microsoft Windows, which is kept open for the U.S. National Security Agency, [FN209] and therefore has taken an official position in favor of Linux. [FN210] Furthermore, the Chinese "don't want one company to monopolize the software market." [FN211] Chen Chong, a deputy minister of information industries who oversees the computer industry in China, added: "[w]ith Linux, we can control the security ... so we can control our own destiny." [FN212] China has "likened dependence on Microsoft to leaving the keys to the country's increasingly computerized economy in the hands of a potential enemy." [FN213] Some may be skeptical about the reliability of complaints coming from the Chinese government, but similar security concerns have also been ***227** expressed, albeit solely as unofficial leaks, by sources that we now tend to regard as more trustworthy, such as the German army. [FN214]

This problem suggests the first answer to the last question addressed in this section, i.e., who are the actors that could promote a major shift toward open source software in developing countries against the strong barriers raised by the network effect that currently favors the dominant proprietary packages? Governments are the obvious first answer because of their position as major consumers of software, especially for their administrative bureaucracy, the military, and for the education system. For instance, "the Government of Mexico is estimated to have saved close to $125 million that would otherwise have been spent on proprietary systems when it signed up Red Hat to implement Linux in more than 140,000 schools and colleges across Mexico." [FN215] However, to my knowledge, such examples are still very limited both in number and in scope. There are only a few projects like these worldwide, and they usually concern only certain ministries or departments rather than concerted national efforts. Microsoft's opposition, sometimes with U.S. backing, plays a role in preventing or delaying such projects. [FN216]

*228 Furthermore, there is tremendous variation in the states' capacity to promote open source effectively. [FN217] The most often cited case of China, for example, is actually quite extreme in this respect, because the "government influence over the market is still so strong, that Beijing's support can turn almost any product into an industry standard domestically." [FN218] Besides, in such extreme cases there is a negative trade-off to consider. "Even Linux enthusiasts profess ambivalence about the government's interest. Linux developers in China say some overseas colleagues worry that China may not play by the rules for collaborating and sharing and may adapt Linux to create a proprietary system instead." [FN219]

The second set of actors that could play an important role in the promotion of open source software as an affordable and legal alternative to proprietary computer programs is the international organizations that are involved in education and development assistance in general. There are already some interesting examples, such as the United Nations Educational, Scientific and Cultural Organization's ("UNESCO") program to promote ***229** Linux in Latin America [FN220] or the United Nations Development Program's ("UNDP") Sustainable Development Networking Program [FN221] with support from Red Hat, Corel, and O'Reilly. [FN222]

Unfortunately, just as in the case of governments, these examples are still the exception rather than the rule. As a disappointed open source advocate put it: "[t]he World Bank is used to signing off on loans that include a line item for software, which really gets under my skin because all this Linux software really costs nothing." [FN223] It is therefore necessary, first of all, to educate such organizations as well as the governments of developing countries about the benefits of

free software. It is a difficult and long-term task, but it is certainly more worthwhile than wasting precious financial resources or continuing to play the degrading cat-and-mouse piracy game.

VII. CONCLUSION

The international intellectual property regime has been heralded by its supporters as the key that would open the door to technological advancement in developing countries. So far, in Central and Eastern Europe it has failed to deliver on this promise, especially with respect to the software industry. Local programmers have little to gain from a stronger protection of copyright in their domestic markets, and this situation is not **230** likely to change soon. At the same time, piracy has turned out to be a necessary evil for the diffusion of software that is legally priced beyond the reach of most local users. Price discrimination could have provided a solution for this conundrum, but there are important economic and political factors that support the status quo, although the much-feared parallel imports are less of a problem than expected. Nevertheless, there are significant technological and cultural developments that should make the actors involved less comfortable about the status quo. These problems clearly require more innovative thinking. Open source software is likely to be an important part of the answer, but the implementation of this solution will require serious efforts to change the current approach of governments in developing countries and the international organizations involved in development assistance.

[FNa1]. Catalin Cosovanu is a 2004 J.D. candidate at Columbia University Law School and a Ph.D. candidate in Political Science at Stanford University. Catalin Cosovanu earned a J.S.M. from Stanford Law School in 2001, an M.A. in Political Science from Stanford University in 1998, an M.A. in International Relations from Central European University in Hungary in 1997, and a law degree from "Al. I. Cuza" University of Iasi, Romania in 1996. Cosovanu would like to thank Professors Lawrence Lessig, Paul Goldstein, John Barton, and Rogelio Perez-Perdomo for their advice and support.

[FN1]. SOFTWARE & INFO. INDUS. ASS'N, SIIA'S REPORT ON GLOBAL SOFTWARE PIRACY 2000 (2000) [hereinafter SIIA'S REPORT], http:// www.siia.net/piracy/pubs/piracy2000.pdf (last visited Nov. 2, 2002); see also BUS. SOFTWARE ALLIANCE, SIXTH ANNUAL BSA GLOBAL SOFTWARE PIRACY STUDY, 2001, at http://www.bsa.org/resources/2001-05-21.55.pdf.

[FN2]. This is essentially an application of what economists call the "Ramsey pricing" rule. Claude E. Barfield & Mark A. Groombridge, Parallel Trade in the Pharmaceutical Industry: Implications for Innovation, Consumer Welfare, and Health Policy, 10 FORDHAM INTELL. PROP. MEDIA & ENT. L.J. 185, 249 (1999); PAUL A. DAVID, THE DIGITAL TECHNOLOGY BOOMERANG: NEW INTELLECTUAL PROPERTY RIGHTS THREATEN GLOBAL OPEN SCIENCE 20 (Stanford Econ. Faculty, Working Papers No. 016,2000), http://www- econ.stanford.edu/faculty/workp/swp00016.pdf.

[FN3]. EUROPEAN SURVEY OF INFO. SOC'Y, PROJECTS AND ACTIONS (2000) [hereinafter ESIS, PROJECTS & ACTIONS], http://www.eu-esis.org/ (last visited Apr. 20, 2003).

[FN4]. EUROPEAN INFO. TECH. OBSERVATORY, EUROPEAN INFORMATION TECHNOLOGY OBSERVATORY 2000 (2000) [hereinafter EITO 2000], www.eito.com.

[FN5]. NAT'L SCI. BD., 1 SCIENCE AND ENGINEERING INDICATORS 2000 (2000), http://www.nsf.gov/sbe/srs/seind00/start.htm (last visited Nov. 7, 2002).

[FN6]. ORG. FOR ECON. COOPERATION & DEV., OECD INFORMATION TECHNOLOGY OUTLOOK 2000: ICTS, E-COMMERCE AND THE INFORMATION ECONOMY (2000) [hereinafter OECD, INFORMATION TECHNOLOGY OUTLOOK], http:// www.oecd.org/pdf/M00032000/M00032082.pdf (last visited Nov. 5, 2002).

[FN7]. Interview with Vlad Tepelea, President, National Association of Software Enterprises ("ANIS"), in Bucharest, Rom. (June 20, 2000); Interview with Vasile Baltac, President, and Dan Mihalca, Member of the Board of Directors, Association for Information Technology and Communications of Romania ("ATIC"), in Bucharest, Rom. (June 21, 2000); Interview with Alexandru Borcea, President, and Florin Vrejoiu, Executive Vice-President, Romanian Association for the Electronics and Software Industry ("ARIES"), in Bucharest, Rom. (June 22, 2000).

[FN8]. Interview with Dan Dascalu, Member of the Romanian Academy, Executive Director, National Institute for Research and Development in Microtechnologies of the Ministry of Education and Research, in Bucharest, Rom. (June 22, 2000).

[FN9]. Interview with Varujan Pambuccian, Member, Chamber of Deputies, Romanian Parliament, in Bucharest, Rom. (June 20, 2000). Mr. Pambuccian is the initiator of legislation on software technology parks, special economic areas, electronic commerce, and electronic signature. He is also the President of the Commission for Information Technology and Telecommunications.

[FN10]. Interview with Nicolae Burchel and Ema Catichi, Attorneys and BSA Representatives for Romania, in Bucharest, Rom. (June 21, 2000). For more information about the BSA, see its website at http://www.bsa.org.

[FN11]. Email Interview with Viorel Apetrei, Anti-Piracy Manager, Microsoft Romania (Jan. 4, 2001); Email Interview with Teodor Todorov, Anti-Piracy Manager, Microsoft Bulgaria (Jan. 22, 2001).

[FN12]. Interview with Judit Gillemot, Anti-Piracy Manager, Microsoft in Hungary, in Budapest, Hung. (July 5, 2001); Interview with Erzsebet Sebok, Head of BSA Hungary, in Budapest, Hung. (July 5, 2001); Interview with Viorel Apetrei, Anti-Piracy Manager, Microsoft Romania, in Bucharest, Rom. (July 17, 2001); Interview with Ema Catichi, attorney and BSA representative for Romania, in Bucharest, Rom. (July 17, 2001).

[FN13]. Interview with Rodica Pirvu, General Director, ORDA, in Bucharest, Rom. (July 18, 2001); Interview with Adrian Ghimpu, Deputy Director, ORDA, in Bucharest, Rom. (July 18, 2001).

[FN14]. Interview with Rene Bonvanie, Marketing Vice President of Oracle, in Redwood Shores, Cal. (Feb. 21, 2001).

[FN15]. Interview with Bradford L. Smith, Deputy General Counsel of Microsoft, in Stanford, Cal. (Apr. 2001).

[FN16]. Interview with George Roth, Chief Executive Officer, Recognos, Romania, in Los Gatos, Cal. (Jan. 2001).

[FN17]. See, e.g., the March 22, 2001 posting by Pirvu Ionica on the ITC (Information Technology and Communications) Lobby on-line discussion list (archived at http://www.agora.ro/tic/ and on file with the author) (statement by Romanian Government Representative acknowleding that BSA has been the only organization consulted for the elaboration of an important government regulation regarding the implementation of copyright protection for software products (Ordinance 124/2000), while the local software producers and their organizations were ignored).

[FN18]. See Cosmin Ghinea, Facilit?rile pentru firmele de IT, încremenite în proiect, ZIARUL FINANCIAR, Mar. 28, 2001, available at http://www.zf.ro.

[FN19]. Mihaiela Grundey & Richard Heeks, Romania's Hardware and Software Industry: Building IT Policy and Capabilities in a Transitional Economy, at 48 (Inst. for Dev. Policy and Mgmt., Development Informatics Working Paper Series No. 2, 1998), http://idpm.man.ac.uk/wp/di/di_wp02.htm.

[FN20]. See EITO 2000, supra note 4.

[FN21]. See THE TECHNOLOGY OF TRANSITION: SCIENCE AND TECHNOLOGY POLICIES FOR TRANSITION ECONOMIES ch. 1-7 (David A. Dyker ed., 1997); Roderick Martin, Central and Eastern Europe and the International Economy: The Limits to Globalization, 50 EUROPE-ASIA STUDIES 7 (1998); David A. Dyker, Learning the Game - Technological Factors of Economic Transformation, 49 EUROPE-ASIA STUDIES 445 (1997) [hereinafter Dyker, Learning the Game]; David A. Dyker, The Computer and Software Industries in the East European Economies - A Bridgehead to the Global Economy?, 48 EUROPE-ASIA STUDIES 915 (1996) [hereinafter Dyker, Computer and Software Industries]; Esther Dyson, How Eastern Europe Is Starting Over, DATAMATION, Mar. 1, 1993, at 67; Slavo Radosevic, Alliances and Emerging Patterns of Technological Integration and Marginalization of Central and Eastern Europe within the Global Economy, in FOREIGN DIRECT INVESTMENT AND TECHNOLOGY TRANSFER IN THE FORMER SOVIET UNION 27 (David A. Dyker ed., 1999); A Survey of Information Technology, BUS. CENT. EUR., Mar. 1997, at 41; Survey E-Commerce: Brave New World, BUS. CENT. EUR., Mar. 1999, at 43.

[FN22]. Grundey & Heeks, supra note 19, at 28.

[FN23]. While software piracy may sometimes infringe other intellectual property rights, piracy in this area means copyright infringement. See SIIA's Report, supra note 1, at 5-6.

[FN24]. PETER EVANS, EMBEDDED AUTONOMY: STATES AND INDUSTRIAL TRANSFORMATION 194 (1995).

[FN25]. Datamonitor defines packaged software as software that is sold in a stand-alone form to the home or the office where a second party does not modify the source code. This can be contrasted with bespoke software, where code has been modified or generated solely for a single or very limited number of projects. Examples of packaged software include Lotus Notes, Microsoft Windows 95, 98, NT and 2000, office suites, desktop publishing software, and even computer games. The Economic Impact of the Packaged Software Industry in Western Europe 5 (Oct. 2000) (proprietary report available for fee from Datamonitor).

[FN26]. The New Economy Survey, ECONOMIST, Sept. 23, 2000, at 5, 30. Another major problem is that the "network externalities" helping first-movers to establish a dominant position will favor American giants, so that local firms in emerging economies will be frozen out. Id. at 34-37.

[FN27]. EVANS, supra note 24, at 194.

[FN28]. SIIA'S REPORT, supra note 1, at 8.

[FN29]. Interview with Burchel and Catichi, supra note 10.

[FN30]. See infra text accompanying notes 43-47.

[FN31]. EITO 2000, supra note 4, at 287. Development of a "solution" means, in this study's parlance, development of an adaptation, often fairly superficial, for a specific business environment of a pre-existent product, not of the design and creation of the packaged software itself. To quote from the source: "specific design and tailoring activities on packaged software developed abroad." Id.

[FN32]. Id. at 290-91.

[FN33]. OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 131.

[FN34]. Id.

[FN35]. Id. at 132.

[FN36]. Bruce Einhorn et al., India 3.0: Its Software Outfits Take on the World, BUS. WK., Feb. 26, 2001, at 44, available at http:// www.businessweek.com:/2001/01_09/b3721015.htm.

[FN37]. This point is also important in measuring what really counts as a packaged software business (i.e., creating and selling your own package or just contributing to the development of another company's product).

[FN38]. For example, in the case of Romania:
Narrow, vertical package markets do exist ... in public administration, manufacturing, health administration, hotel management, insurance, accounting, etc. Local software firms are addressing these markets but their "packages" are often just a set of menu or window interfaces that are used as a marketing or development platform for further customisation. In addition, the growing competition from multinational imports (both legal and pirated) increasingly threatens even these local developments.
Grundey and Heeks, supra note 19, at 55.

[FN39]. OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 137.

[FN40]. Id.

[FN41]. NAT'L SCI. BD., supra note 5, at 59-60.

[FN42]. OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 137-38.

[FN43]. Interview with George Roth, supra note 16.

[FN44]. George Roth, How To Do IT Business in Romania, Presentation at the Romanian-American Business Network Conference (Jan. 15, 2000).

[FN45]. Id.

[FN46]. EVANS, supra note 24, at 196.

[FN47]. One important implication is the fact that this low level outsourcing work often absorbs IT human resources that are scarce in developing countries too. Id. at 195. See also Grundey and Heeks, supra note 19, at 46. This problem is augmented further by the aforementioned external brain drain.

[FN48]. See generally Michael L. Katz & Carl Shapiro, Network Externalities, Competition, and Compatibility, 75 AM. ECON. REV. 424 (1985) (discussing the concept of "network externalities").

[FN49]. Id.; see also S.J. Liebowitz & Stephen E. Margolis, Network Externality: An Uncommon Tragedy, 8 J. ECON. PERSP. 133, 133 (1994) (stating that computer software is a good that exhibits network externalities).

[FN50]. The New Economy Survey, supra note 26, at 30.

[FN51]. Id. at 30-31.

[FN52]. Grundey and Heeks, supra note 19, at 54.

[FN53]. OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 134-35.

[FN54]. Id.

[FN55]. See Grundey and Heeks, supra note 19, at 54.

[FN56]. "Finance is not a major problem for software service firms .... However, obtaining finance is a major concern for firms developing software products." OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 141; see also Sudha Nagaraj, Floating Ventures, Hunting Money, COMPUTERS TODAY, Feb. 15, 1999, 1999 WL 7533059.

[FN57]. See WORLD BANK, THE NETWORKING REVOLUTION: OPPORTUNITIES AND CHALLENGES FOR DEVELOPING COUNTRIES, http:// www.infodev.org/library/working.html; see also WORLD BANK, GLOBAL INFORMATION TECHNOLOGY REPORT 2002-2003: READINESS FOR THE NETWORKED WORLD, http:// www.weforum.org/pdf/Global_Competitiveness_Reports/Reports/GITR_2002_ 2003/Contents.pdf.

[FN58]. See generally EUROPEAN SURVEY OF INFO. SOC'Y, BASIC FACTS & INDICATORS: ROMANIA (2000) [hereinafter ESIS, BASIC FACTS & INDICATORS], http://www.eu-esis.org/esis2basic/R0basic7.htm (last modified Jan. 2001).

[FN59]. Id.

[FN60]. ESIS PROJECT MGMT. SUPPORT TEAM, EUROPEAN SURVEY OF INFO. SOC'Y, INFORMATION SOCIETY INDICATORS IN THE MEMBER STATES OF THE EUROPEAN UNION 13 (2000) [hereinafter ESIS, INDICATORS IN THE EU], http://www.eu- esis.org/Basic/HomeBasic.htm (last visited Feb. 5, 2003).

[FN61]. ESIS PROJECT MGMT. SUPPORT TEAM, EUROPEAN SURVEY OF INFO. SOC'Y, INFORMATION SOCIETY INDICATORS IN THE COUNTRIES OF CENTRAL AND EASTERN EUROPE 6 (2001) [hereinafter ESIS, INDICATORS IN CENTRAL AND EASTERN EUROPE], http:// www.eu-esis.org/esis2basic/esis2basic.htm Basic/HomeBasic.htm (last visited Feb. 5, 2003).

[FN62]. ESIS, PROJECTS & ACTIONS, supra note 3.

[FN63]. Microsoft's Cunning Plan, ECONOMIST, Jan. 6, 2001, at 53.

[FN64]. Grundey and Heeks, supra note 19, at 53.

[FN65]. OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 67.

[FN66]. EITO 2000, supra note 4, at 26, 255, 273.

[FN67]. See, e.g., DATAMONITOR, THE IMPACT OF THE SOFTWARE SECTOR ON THE ECONOMIES OF EASTERN EUROPE 42 (June 2001).

[FN68]. See infra text accompanying note 95 (Average monthly wage table).

[FN69]. To illustrate this point, imagine that the price of Microsoft Office in the United States was actually $8000. How many copies would still be sold at this price, twenty times higher than the current one? Unfortunately, these are the kind of numbers that a person or a business has to deal with in economies where the average monthly income is below $200. See infra text accompanying notes 84-97.

[FN70]. OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 25.

[FN71]. The New Economy Survey, supra note 26, at 32.

[FN72]. Id.

[FN73]. Stephen D. Oliner & Daniel E. Sichel, The Resurgence of Growth in the Late 1990s: Is Information Technology the Story?, at 22 (2000 Finance and Economics Discussion Series, 2000). (Stating that "[a]ll in all, we estimate that the use of information technology ... accounted for about two-thirds of the step-up in productivity growth between the first and second halves of the [1990-2000] decade."), http://www.federalreserve.gov/pubs/feds/2000/index.html (last visited Jan. 27, 2003). For the assessment and analysis of the impact of IT on overall economic productivity and growth, see PAUL SCHREYER, THE CONTRIBUTION OF INFORMATION AND COMMUNICATION TECHNOLOGY TO OUTPUT GROWTH: A STUDY OF THE G7 COUNTRIES (Directorate For Sci., Tech. and Indust., Working Paper No. 2000/2, Mar. 23, 2000), http://www.oils.oecd.org/oils/2000doc.nsf; Andrea Bassanini et al., Knowledge, Technology And Economic Growth: Recent Evidence From OECD Countries (150th Anniversary Conference of the Nat'l Bank of Belg.: How to Promote Econ. Growth in the Euro Area, May 31, 2000), http:// www.oecd.org/media/release/NBB29May.pdf.

[FN74]. In essence, it is a vicious circle: using less IT means making less money, which in turn means getting less IT.

[FN75]. NAGY HANNA, ET AL., THE DIFFUSION OF INFORMATION TECHNOLOGY: EXPERIENCE OF INDUSTRIAL COUNTRIES AND LESSONS FOR DEVELOPING COUNTRIES 10 (World Bank, Discussion Paper No. 281, 1995).

[FN76]. Jeffrey D. Sachs, A New Map of the World, ECONOMIST, Jan. 3, 2001, at http://www.cid.Harvard.edu/cidinthenews/articles/sachs_on_globalisation.htm. Jeffrey Sachs is Director of the Center for International Development and professor of international economics at Harvard University. He has advised the governments of many developing and Eastern European countries.

[FN77]. See infra text accompanying note 95 (Average monthly wage table).

[FN78]. Why would businesses or even individual users continue to buy pirated products if the cost of legal licenses would be competitive with the black market prices? See infra Part V.A.

[FN79]. A proper, extensive examination of cultural factors in this context is beyond the scope of the article. Yet, even a cursory look at the global "geography of piracy" suggests that where the differences in economic conditions are substantial, the role of culture seems to become secondary. The piracy rate in rich Taiwan is now only half of the rate in not-so-rich mainland China, SIIA'S REPORT, supra note 1, at 14, yet both share the legacy of Confucianism and the Chinese culture's overall disfavor of intellectual property. Furthermore, if one wants to look at more recent cultural legacies, there are major differences, as high as 40%, between piracy rates in various Central and Eastern European countries despite the ideological hostility to IPRs of the communist regimes that once ruled across the region. Id. For the view that cultural traditions do play a

central role in determining the level of IPR protection, see WILLIAM ALFORD, TO STEAL A BOOK IS AN ELEGANT OFFENSE: INTELLECTUAL PROPERTY LAW IN CHINESE CIVILIZATION (1995).

[FN80]. John Perry Barlow, The Economy of Ideas: A Framework for Rethinking Patents and Copyrights in the Digital Age (Everything You Know About Intellectual Property Is Wrong), WIRED, Mar. 1994, at 84.

[FN81]. PAUL ROMER, TWO STRATEGIES FOR ECONOMIC DEVELOPMENT: USING IDEAS AND PRODUCING IDEAS (Washington, D.C.: Proceedings of the World Bank Annual Conference on Development Economics, 1992).

[FN82]. The New Economy Survey, supra note 26, at 38.

[FN83]. See EVANS, supra note 24.

[FN84]. The World Bank study of IT diffusion put it bluntly and stated that "for most developing countries, the development of local IT suppliers should be encouraged only as necessary to improve the competitiveness of IT users. Developing countries need early, inexpensive experience to build a critical mass of local users and start them on a cumulative learning path." HANNA, ET AL., supra note 75, at xvii.

[FN85]. DANNY QUAH, THE WEIGHTLESS ECONOMY IN ECONOMIC DEVELOPMENT 29-30 (The United Nations University, World Institute for Development Economics Research, Working Paper No. 155, 1999), www.wider.unu.edu/publications/wp155.pdf (last visited Nov. 7, 2002).

[FN86]. Duane Goehner, Ponderous Piracy Problem -- Russia (1997), at http:// www.goehner.com/piracyru.htm (last visited Nov. 5, 2002).

[FN87]. Microsoft Corp., Microsoft Worldwide Sites-European Region: Europe, at http://www.microsoft.com/worldwide/europe.htm (last modified Jan. 12, 2002). The price list, available on May 1, 2002 at http://www.microsoft.com/Romania, suggests the same overall uniformity of prices for the latest XP generation of products (e.g. the Romanian edition of Office XP costs $456.25, similar to the price of the English edition on the U.S. market).

[FN88]. See generally id.

[FN89]. ADOBE SYS. INC., ADOBE SYSTEMS--CENTRAL, EASTERN EUROPE AND MIDDLE EAST, at http://www.adobeceea.com (last visited Nov. 5, 2002).

[FN90]. Leslie Chang, In China's Software Market, a Hundred Microsoft- Bashers Bloom, WALL ST. J., Dec. 31, 1999, at B1; Craig Smith, China Moves to Cut Power of Microsoft, N.Y. TIMES, July 8, 2000, at A1.

[FN91]. Graham Lea, High Prices, False Steps Help Windows Lose to Linux in China, THE REGISTER, Aug. 8, 2000, http:// www.theregister.co.uk/content/archive/12449.html; Goehner, supra note 86.

[FN92]. See generally U.S. CENSUS BUREAU, U.S. DEP'T OF COMMERCE, STATISTICAL ABSTRACT OF THE UNITED STATES: 2001 (121st ed. 2001) [hereinafter U.S STATISTICAL ABSTRACT], available at http:// www.census.gov/prod/www/statistical-abstract-us.html (last visited Jan. 12, 2002).

[FN93]. Eurostat Yearbook: A Statistical Eye on Europe, 2000 OFF. FOR OFFICIAL PUBL'NS OF THE EUR. CMTYS. 161, available at http:// europa.eu.int/comm/eurostat (last visited Jan. 30, 2002).

[FN94]. See generally Family Income and Expenditure Survey (2001 Yearly Average) All Households, STAT. BUREAU & STAT. CTR. MINISTRY OF PUB. MGMT., HOME AFFAIRS, POSTS AND TELECOMMS. (Feb. 8, 2001), http:// www.stat.go.jp/english/index.htm (last visited Nov. 6, 2002).

[FN95]. November 2002: Statistics, BUS. CENT. EUR., at http:// www.bcemag.com/statsdb/index.php3 (last visited Jan. 8, 2001).

[FN96]. SOFTLOCK INT'L LTD. SOFTWARE PIRACY IN ROMANIA (2002) (emphasis added), http://www.softlok.com/general/piracy_ro.htm, (last visited Nov. 6, 2002).

[FN97]. The parallel imports (a.k.a. parallel trade) question is briefly presented by Frederick Abbott as follows:
To what extent should intellectual property rights (IPRs) holders within particular national/regional territories be entitled to restrict the importation of goods and services into those territories on the basis of local IPRs ownership when the subject goods and services have been placed on the market outside the territory of importation with their consent?
Frederick M. Abbott, First Report (Final) to the Committee on International Trade Law of the International Law Association on the Subject of Parallel Importation, 1 J. of INT'L ECON. L. 607, 608 (1998) [hereinafter Abbott, Parallel Importation Report].

[FN98]. Interview with Burchel and Catichi, supra note 10.

[FN99]. Id.

[FN100]. Obviously, I do not refer here to domestic price discrimination (e.g., cheaper books in paperback sold after the release of the hardcover version). See PAUL GOLDSTEIN, INTERNATIONAL INTELLECTUAL PROPERTY LAW, 272-73 (reader for Law 329, Stanford Law School, Fall 2000) (copy on file with author).

[FN101]. Alexander J. Stack, TRIPS, Patent Exhaustion and Parallel Imports, 1 J. WORLD INTELL. PROP. 657, 683 (1998); see also Richard P. Rozek & Richard T. Rapp, Parallel Trade In Pharmaceuticals: The Impact on Welfare and Innovation, 7 J. OF ECON. INTEGRATION 181 (1992). They argue that for "price discrimination to persist, ... there must be no opportunity for arbitrage or resale of the product obtained in the low-price countries to consumers in the high-price countries." Id. at 183.

[FN102]. Under territorial (national or regional) exhaustion, the authorized distribution of a certain good incorporating intellectual property will "exhaust" the intellectual property owner's rights against the possession and redistribution of that particular good (i.e., the good itself, not the IP incorporated in it) only within that territory. The IPRs in each national or regional jurisdiction are treated as distinct, so although the distribution rights over the good are exhausted domestically through the first sale, their owner can still hold them against redistribution between jurisdictions. International exhaustion, on the other hand, extends the effect of the first sale globally. The resulting parallel imports undermine geographical price discrimination, among other effects. WARWICK A. ROTHNIE, PARALLEL IMPORTS 575 (1993).

[FN103]. See generally Frederick M. Abbott, The Enduring Enigma of TRIPS: A Challenge to the World Economic System, 1 J. OF INT'L ECON. L. 497 (1998) [hereinafter Abbott, Enduring Enigma of TRIPs]; Abbott, Parallel Importation Report, supra note 97. To be fair, I should note that there are some IPR skeptics that take a more balanced view on price discrimination. See, e.g., Stack, supra note 101, at 687-88.

[FN104]. See, e.g., Abbott, Parallel Importation Report, supra note 97, at 609; R.V. Vincent Chiappetta, The Desirability of Agreeing to Disagree: The WTO, TRIPS, International IPR Exhaustion and a Few Other Things, 21 MICH. J. INT'L L. 333, 347-57 (2000); R.V. Vaidyanatha Ayyar, Interest or Right?: The Process and Politics of a Diplomatic Conference on Copyright, 1 J. OF WORLD INTELL. PROP. 3, 16-17 (1998). There are a few interesting exceptions, such as Canada, Australia, New Zealand, and most Scandinavian countries, that supported international exhaustion during the Trade-Related Aspects of Intellectual Property Rights ("TRIPS") negotiations.

[FN105]. Abdulqawi A. Yusuf & Andrés Moncayo von Hase, Intellectual Property Protection and International Trade: Exhaustion of Rights Revisited, 16 WORLD COMPETITION L. & ECON. REV. 115, 130 (1992).

[FN106]. Supporters of international exhaustion contend that "the resulting flow of parallel imports would have the salutatory effect of forcing precisely those market competition efficiencies envisioned by the free-trade principles driving GATT and its WTO successor." Chiappetta, supra note 104, at 346. Based on the presumably lower manufacturing costs in developing countries, some argue that "[p]arallel imports will serve to assure that an adequate level of price competition is maintained in international markets." Abbott, Parallel Importation Report, supra note 97, at 622.

[FN107]. Abbott, Parallel Importation Report, supra note 97, at 627.

[FN108]. Id.

[FN109]. Stack, supra note 101, at 683. Some commentators suggest that territorial exhaustion "avoids unnecessary intrusion

on the strong tradition of national sovereignty over intellectual property matters." Chiappetta, supra note 104, at 346. The irony is that TRIPS itself has achieved precisely this kind of intrusion, not to mention that in our increasingly globalized world one cannot simply assume that an "intrusion on sovereignty" is a priori a development with negative implications.

[FN110]. See Barfield & Groombridge, supra note 2, at 250-51; Patricia M. Danzon, The Economics of Parallel Trade, 13 PHARMACOECONOMICS 294, 300 (1998).

[FN111]. Moreover, the states play a role in insuring the provision of pharmaceutical products (unlike many other IP-related products).

[FN112]. Barfield & Groombridge, supra note 2, at 250-51; Danzon, supra note 110, at 300.

[FN113]. Abbott, Parallel Importation Report, supra note 97, at 621. "If a developed country producer does not supply a market with an important ... product either by production or importing ... a developing country government may be justified in issuing a compulsory license to a local producer to satisfy local demand." Id.

[FN114]. Agreement on Trade-Related Aspects of Intellectual Property Rights, Apr. 15, 1994, art. 22-24, 33 I.L.M. 1125, 1869 U.N.T.S. 299 [hereinafter TRIPS].

[FN115]. Id. art. 13.

[FN116]. Abbott, Parallel Importation Report, supra note 97, at 613.

[FN117]. See, e.g., DAVID A. MALUEG & MARIUS SCHWARTZ, PARALLEL IMPORTS, DEMAND DISPERSION, AND INTERNATIONAL PRICE DISCRIMINATION 18 (U.S. Dep't of Justice, Antitrust Div., Econ. Analysis Group Discussion Paper No. 93-6, 1993).

[FN118]. Abbott, Parallel Importation Report, supra note 97, at 613.

[FN119]. Articles 3 and 4 provide for national treatment and most-favored- nation treatment respectively with regard to IPRs protection. TRIPS, supra note 114, art. 3-4.

[FN120]. Id. art. 6.

[FN121]. World Intellectual Property Organization Copyright Treaty, 1996, art. 6(2), WIPO Pub. No. 226(e).

[FN122]. Article 36 of the EC Treaty provides that the protection of IPRs as well as other prohibitions shall not constitute "a disguised restriction on trade between Member States." Treaty on European Union, Feb. 7, 1992, 1992 O.J. (C 224)1, 16-17.

[FN123]. Id. at 15, 16-17, 75-76.

[FN124]. See generally Case 78/70, Deutsche Grammophon Gesellschaft mbH v. METRO-SB-Grossmarkte GmbH & Co., 1971 E.C.R. 487, [1971] 10 C.M.L.R. 631 (1971); Joined Cases 55 & 57/80, Musik-Vertrieb membran GmbH v. Gesellschaft für musikalische Aufführungs [GEMA], 1981 E.C.R. 147, 31 C.M.L.R. 44 (1981); Case 15/74, Centrafarm BV v. Sterling Drug Inc., 1974 E.C.R. 1147, [1974 Transfer Binder] Common Mkt. Rep. (CCH) ¶ 8246 (1974); see also Agreement Relating to Community Patents, Dec. 15, 1989, art. 76, 1989 O.J. (L401)1.

[FN125]. Case 270/80, Polydor Ltd and RSO Records, Inc. v. Harlequin Record Shops and Simons Records Ltd., 1982 E.C.R. 329, [1982] 1 C.M.L.R. 677 (1982) (stating "[t]he enforcement by the proprietor ... of copyrights protected by the law of a member state against the importation and marketing of gramophone records lawfully manufactured and placed on the market in the Portuguese Republic [at the time, in a free trade agreement with, but not a member of, the European Community] by licensees of the proprietor is justified").

[FN126]. See Quality King Distribs. v. L'Anza Research Int'l, 523 U.S. 135, 45 U.S.P.Q.2d (BNA) 1961 (1998).

[FN127]. 17 U.S.C.A. § 602(a) (1996).

[FN128]. Id. (stating "the owner of a particular copy or phonorecord lawfully made under this title, or any person authorized by such owner, is entitled, without the authority of the copyright owner, to sell or otherwise dispose of the possession of that copy or phonorecord").

[FN129]. L'Anza, 523 U.S. at 152, 45 U.S.P.Q.2d (BNA) at 1968.

[FN130]. Id. at 154, 45 U.S.P.Q.2d (BNA) at 1969 (Ginsburg, J., concurring).

[FN131]. Margreth Barrett, The United States' Doctrine of Exhaustion: Parallel Imports of Patented Goods, 27 N. KY. L. REV. 911, 917 (2000) (reprinted in 32 INTELL. PROP. L. REV. 231 (2001)) (emphasis added). Prof. Barrett illustrates this line of cases with Columbia Broad. Sys., Inc. v. Scorpio Music Distribs., Inc., 569 F. Supp. 47 (E.D. Pa. 1983), aff'd, 738 F.2d 421 (3d Cir. 1984)("construing the language 'lawfully made under this title' in Copyright Act § 109(a) as imposing a geographic limitation on the first sale doctrine, limiting its applicability to copies and phonorecords lawfully manufactured in the United States"). Barrett, supra note 131, at 917 n.21.

[FN132]. Jazz Photo Corp. v. ITC, 264 F.3d 1094, 1105, 59 U.S.P.Q.2d (BNA) 1907, 1914 (Fed. Cir. 2001).

[FN133]. See Darren E. Donnelly, Parallel Trade And International Harmonization Of The Exhaustion Of Rights Doctrine, 13 SANTA CLARA COMPUTER & HIGH TECH. L.J. 445, 484-85, (1997); Barfield and Groombridge, supra note 2, at 200; Ako Shimada Williams, International Exhaustion of Patent Rights Doctrine: Is Japan's Move a Step Forward or Back from the Current Harmonization Effort, 7 J. INT'L L. & PRAC. 327 (1998).

[FN134]. Barfield & Groombridge, supra note 2, at 200.

[FN135]. The empirical evidence, however, is rather limited. See Abbott, Parallel Importation Report, supra note 97, at 613.

[FN136]. Interview with Burchel & Catichi, supra note 10.

[FN137]. It is interesting to note that using product differentiation to prevent parallel imports is not exactly a new idea in the computer industry, both in hardware and software. For example, in Rothnie's Parallel Imports, setting forth a set of interviews concerning the European computer industry in 1990, when dealing with parallel trade, one of the respondents' strategies was "localization -- adapting the product so that the version sold in one market would not work (or was less attractive) in other markets. The demand for localization was given as a reason why parallel imports were not a very significant problem within the EC." ROTHNIE, supra note 102, at 522, 588.

[FN138]. Interview with Nick Parlante, Professor of User Interfaces, Stanford University Computer Science Department, Cal. (Feb. 2001).

[FN139]. Richard Ishida, Challenges in Designing International User Information, XEROX GLOBAL DESIGN (1997) at: http://www.xerox- emea.com/globaldesign/paper/paper1.htm.

[FN140]. Parlante, supra note 138; see also Nadine Kano, DEVELOPING INTERNATIONAL SOFTWARE FOR WINDOWS 95 AND WINDOWS NT (Microsoft Developer Network Library Book) available at: http://msdn.microsoft.com/library/ (last visited Mar. 27, 2001). Kano also estimates minimal costs if the following suggestions, based on the separation of language resources from the code itself, are adhered to: "[p]rogram specs account for international considerations from the outset"; "[a]ll international editions of the program are compiled from one set of source files"; "[c]ode is generic enough to work for several languages" (e.g., "[c]ode doesn't contain hard-coded character constants, numeric constants, screen positions, filenames, or pathnames that presume a particular language"). Id.

[FN141]. MICROSOFT, INC., OVERVIEW OF INTERNATIONAL FEATURES IN OFFICE 2000, http://www.microsoft.com/Office/ORK/2000/Six/85ct_2.htm (last updated Mar. 22, 1999).

[FN142]. "If we were to sell our software at a much lower price in Romania, it would be bought wholesale and next week we would see it resurface in Germany." Interview with Burchel and Catichi, supra note 10.

[FN143]. See infra Part V.A.

[FN144]. Interview with Bonvanie, supra note 14.

[FN145]. With the caveat about the relative importance of cultural vs. economic factors expressed supra note 79.

[FN146]. See supra text accompanying note 95 (Average monthly wage table).

[FN147]. About $3-5, based on my own experience. See also Email Interview with Apetrei, supra note 11.

[FN148]. See supra notes 86-97 and accompanying text.

[FN149]. Offered, also temporarily, on Microsoft Visual C++ and Fox PRO to individual developers in Romania. Email Interview with Apetrei, supra note 11.

[FN150]. Id.

[FN151]. Id.

[FN152]. Email Interview with Todorov, supra note 11.

[FN153]. Email Interview with Apetrei, supra note 11.

[FN154]. Id.; Email Interview with Todorov, supra note 11.

[FN155]. Email Interview with Todorov, supra note 11.

[FN156]. Hard disk loading is "installing unauthorized copies of software onto the hard disks of personal computers, often as an incentive for the end user to buy the hardware from that particular hardware dealer." SIIA'S REPORT, supra note 1, at 7.

[FN157]. Interview with Apetrei, supra note 12; Email Interview with Todorov, supra note 11.

[FN158]. Interview with Apetrei, supra note 12; Email Interview with Todorov, supra note 11.

[FN159]. Interview with Bonvanie, supra note 14.

[FN160]. Interview with Apetrei, supra note 12.

[FN161]. SIIA'S REPORT, supra note 1, at 14.

[FN162]. Interview with Apetrei, supra note 12.

[FN163]. EUROPEAN SURVEY OF INFO. SOC'Y, ROMANIA: BASIC FACTS AND INDICATORS (2001), at http://www.eu-esis.org/esis2basic/RObasic7.htm (last updated Jan. 2001).

[FN164]. Interview with Apetrei, supra note 12.

[FN165]. From 11% of the total market to almost 100%.

[FN166]. OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 67.

[FN167]. Interview with Roth, supra note 43; see also SOFTLOK INT'L LTD., supra note 96.

[FN168]. Interview with Roth, supra note 43.

[FN169]. As I showed above, pirated software remains widely available, and Central and Eastern Europe continues to be the region with the highest piracy rate in the world. See SIIA'S REPORT, supra note 1, at 14.

[FN170]. The long-term scenario could be that increased use of IT would spur more economic growth. Therefore, with the

pirates gone, prices could go up in a richer country, following the increase in purchasing power, and hence the profits would go up too. But IT, however important, is not the Holy Grail of development, or at least not the only one. Such an optimistic scenario depends on many other factors, so it remains in the realm of speculation.

[FN171]. Interview with Smith, supra note 15 .

[FN172]. Id.

[FN173]. Id.; Interview with Bonvanie, supra note 14.

[FN174]. Interview with Bonvanie, supra note 14. Indeed, to quote from their website, "Oracle makes virtually all of its most popular software freely available" on the web. See http://otn.oracle.com/ (last visited Oct. 28, 2001). However, one should note that Oracle is in a market that is very different from that of general applications. Among other factors, service matters much more, so most users (in this case firms rather than individuals) end up paying for licenses anyway.

[FN175]. OECD, INFORMATION TECHNOLOGY OUTLOOK, supra note 6, at 67.

[FN176]. Barfield & Groombridge, supra note 2, at 195; MALUEG & SCHWARTZ, supra note 117, at 20. Frederick T. Schut & Peter Van Bergeijk, International Price Discrimination: The Pharmaceutical Industry, WORLD DEVELOPMENT, Sept. 1986, at 1141-50.

[FN177]. A War Over Drugs and Patents, ECONOMIST, Mar. 10, 2001, at 43.

[FN178]. Danzon, supra note 110, at 293; see also ROTHNIE, supra note 102, at 494.

[FN179]. A War Over Drugs and Patents, supra note 177, at 43-44; William Dowell, Ethics and AIDS Drugs: Some Countries Want to Suspend Patent and Trade Laws to Get Lower-Cost Medications to the Poor, TIME, July 12, 1999, at 49.

[FN180]. See generally Sachs, supra note 76 (generally arguing a link between technological development and societal health).

[FN181]. See supra Part V.A.

[FN182]. The solution he suggested if such a situation were to occur is countrywide site licenses negotiated with the governments of developing countries. Interview with Smith, supra note 15.

[FN183]. Roth, supra note 44.

[FN184]. See LAWRENCE LESSIG, CODE AND OTHER LAWS OF CYBERSPACE 127-30 (Basic Books, 1999); Mark Stefik, Trusted Systems, SCIENTIFIC AMERICAN, Mar. 1997, available at http://www.sciam.com/0397issue/0397stefik.html. (last visited Aug. 12, 2001); Mary Jo Foley, Microsoft and Piracy: Try, Try Again, ZD NET NEWS, Jan. 12, 2001, available at http:// www.zdnet.com/zdnn/stories/news/0,4586,2674261,00.html.

[FN185]. John Borland, Antipiracy Efforts Spark Battle Over Computer Hardware, CNET NEWS, Mar. 23, 2001, available at: http://news.cnet.com/news/0- 1005-201-5211420-0.html.

[FN186]. For the definition of open source software, see infra note 194.

[FN187]. "[C]omputer code that appeared in late 1999 and allows encrypted DVD movies to be read. By reverse-engineering the Content Scrambling System (CSS) method that had been adopted by the MPAA (Motion Picture Association of America) to prevent the playing of DVD movies on unlicensed DVD players, the developers of the DeCSS utility made possible the online trading of DVD movies." PCTechGuide Glossary, at http:// www.forums.pctechguide.com/glossary/wordfind.php?wordInput=DeCSS.

[FN188]. Interview with Smith, supra note 15.

[FN189]. SIIA'S REPORT, supra note 1; SOFTLOK INT'L LTD., supra note 96.

[FN190]. But see supra, note 67.

[FN191]. Lily Nguyen, Linux Fans Greet Torvalds: Creator of Open-Source Computer System Greeted Like a Pop Star, THE TORONTO STAR, June 1, 2000.

[FN192]. Jonah Greenberg, Linux in China: Not Ready for Prime Time, SALON.COM, Aug. 9, 2000, at http://www.salon.com/tech/feature/2000/08/09/linux_ china/.

[FN193]. Open source software provides access to the program's source code, the right to make copies of the computer program and distribute them, and the right to modify the program. See OPEN SOURCE, THE OPEN SOURCE DEFINITION, VERSION 1.9, at http://www.opensource.org/docs/definition_plain.html; see also Bruce Perens, The Open Source Definition, in OPEN SOURCES: VOICES FROM THE OPEN SOURCE REVOLUTION (Chris DiBona, Sam Ockman, and Mark Stone, eds., 1999).

[FN194]. Thomas E. Weber, A Plan to End Microsoft's Dominance (No Lawyers Needed), WALL ST. J., May 15, 2000.

[FN195]. Linux Tipped to Open Source, REUTERS/THE AGE, Apr. 18, 2000, 2000 WL 17150885.

[FN196]. Chin Wah Wong, IBM to Spend $200M on Linux Development in Asia, IDG COMMUNICATIONS, Feb. 16, 2001, at http://www.idg.net/ic_429743_4394_1- 483.html.

[FN197]. SIIA'S REPORT, supra note 1; Greenberg, supra note 192.

[FN198]. Evan Leibovitch, Watching the World Get Linux, ZDNET NEWS, Nov. 8, 2000, at http://www.zdnet.com/2102-11-503/08.html.

[FN199]. EITO 2000, supra note 4.

[FN200]. Email interview with Apetrei, supra note 11.

[FN201]. As mentioned in the previous section, supra Part V.D., the pre- installation of pirated copies of Windows on new PCs remains widespread.

[FN202]. Laura Fokkena, Like Breast Milk and Goat Poop: The Case for Using Open Source Software in the Third World, at http://www.kiteinc.org/Goats (last modified Apr. 26, 2002).

[FN203]. Greenberg, supra note 192.

[FN204]. Id.

[FN205]. Interview with Marius-Ioan Piso, Chief Executive Officer of the Romanian Space Agency (Apr. 2001).

[FN206]. Leibovitch, supra note 198.

[FN207]. Id.

[FN208]. Id.

[FN209]. Lea, supra note 91; Greenberg, supra note 192; Smith, supra note 90; Steven Chase, Linux System Finds a Friend in China, THE GLOBE AND MAIL, Nov. 16, 2000.

[FN210]. Greenberg, supra note 192; Lea, supra note 91; Chase, supra note 209.

[FN211]. Smith, supra note 90.

[FN212]. Id.

[FN213]. Id.

[FN214]. Bundeswehr verbannt Microsoft-Programme, DER SPIEGEL, Mar. 17, 2001, at http://www.spiegel.de/netzwelt/politik/0,1518,123170,00.html; John Lettice, German Armed Forces Ban MS Software, Citing NSA Snooping, THE REGISTER, Mar. 17, 2001, at http:// www.theregister.co.uk/content/archive/17679.html. There is also an official denial. See John Lettice, Microsoft Nein Danke: Snoop Scares Dog US IT In Europe, THE REGISTER, Mar. 17, 2001, at http:// www.theregister.co.uk/content/archive/17710.html.

[FN215]. Venkatesh Hariharan, Why Linux Makes Sense for India, Jan. 31, 2001, at http://slashdot.org/features/00/01/30/1042201.shtml.

[FN216]. Agustin d'Empaire, Microsoft's Big Stick in Peru, WIRED, July 29, 2002, available at http://www.wired.com/news/business/0,1367,54141,00.html.

[FN217]. Not to mention that even in cases where this capacity is high, government promotion of open source may take a long time to lead to widespread individual use: "A massive installation of Linux in government departments and schools across the country could be a precursor to family use when today's rural youth grow up, make money, move into the cities and buy computers for their children. But that scenario is still far away." Greenberg, supra note 192.

[FN218]. Smith, supra note 90. The impact of such a move, however, would most likely not be limited to China or even the developing countries in general: "If the world's biggest potential market went Linux, it is easy to envisage a consequent domino effect that would not just strengthen Linux in the rest of Asia, but have a profound effect in the western world as well." Lea, supra note 91.

[FN219]. Lea, supra note 91.

[FN220]. See the program description at http:// www.unesco.org/webworld/news/2001/010621_latinamerica.shtml.

[FN221]. See the program description at http://www.sdnp.undp.org/.

[FN222]. For more examples, see Danny Yee, Development, Ethical Trading, and Free Software, Position Paper, Nov. 30, 1999, at http:// danny.oz.au/freedom/ip/aidfs.html.

[FN223]. Dan Shearer, quoted by David M. Walker, Open Up To The World, THE AGE, Mar. 28, 2000, available at 2000 WL 17149150.

END OF DOCUMENT