Counterfeiting and Piracy: Measurement Issues

Background report for the
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SUMMARY AND CONCLUSIONS

1. One of the key issues to be addressed in the analytic report being prepared by the OECD Secretariat on counterfeiting and piracy concerns the methodologies and techniques that could be employed to measure the *(i)* magnitude, *(ii)* scope and *(iii)* effects of the illicit practices. In its first phase, the project will focus on the production, distribution and sale of tangible products that infringe trademarks, copyrights, patents or design rights. This paper reviews the types of information that are available on the different types of infringements, and summarises some of the key initiatives that have been taken to measure trends and effects.

I. Magnitude and scope

2. The report reviews the types of information that are available on the magnitude and scope of counterfeiting and piracy from three sources: *(i)* enforcement information; *(ii)* surveys and sampling and *(iii)* economic modelling and other approaches.

Enforcement information

3. Enforcement information includes data that have been compiled on seizures of infringing products within economies and at borders, and information compiled on legal actions that have been taken by parties to defend their protected intellectual property rights. The information on seizures would seem to provide a good basis for developing information on the scope of trademark-infringing products (*i.e.*, information on what is being counterfeited and where counterfeiting is taking place); limitations suggest that the data are not, however, well-suited for developing estimates on the magnitude of counterfeiting.

4. Data on successful legal challenges taken by patent, copyright and design rights holders would seem to provide a good basis for developing insights into both the magnitude and scope of infringements in these areas. The extent to which such information is available is not, however, clear.

Issues:

- To what extent are economies compiling information on seizures and related enforcement activities? How systematic is the reporting?

- Apart from seizures and successful legal challenges, what other types of enforcement information is available that could provide insights into the magnitude and scope of counterfeiting and piracy?

- What do the different types of available data reveal about the counterfeiting and piracy situation?

- With respect to seizure data, to what extent and in what ways are the data biased? How do detection and interception rates vary among different sectors or products? To what extent do the data on the sources of counterfeit and pirated products provide a picture of the overall situation (*i.e.*, in what ways could the data be distorted)?

- What techniques could be employed to enhance the usefulness of enforcement data?

- With respect to seizure what techniques are being used to establish the value of seizures? Are other units of measurement available that may be more useful on a sectoral basis?

Surveys and sampling

5. *Surveys* can be conducted on consumers, producers, or distributors depending on the research objective, and may prove valuable not only as a first hand observation of the magnitude but also as inputs in more sophisticated impact measurement models. Such surveys are, however, sensitive to the way questions are constructed, as well as the willingness of respondents to tell the truth about unlawful behaviour.

6. *Consumer surveys* seem well-suited for developing information on the purchasing patterns and attitudes of consumers. They can lead to a better understanding of the markets for different types of counterfeit and pirated items, but the patterns are difficult to extrapolate from. Most surveys, for example, collect information that can be used to measure the extent to which consumers purchase infringing products; but information on consumption levels, which is critical for estimating magnitude, is generally lacking. In addition, the surveys can also be useful for developing information on the distribution channels by which counterfeits flow to end-users. It should be noted, however, that survey results depend on the consumers' actual awareness of infringements in the product area under investigation. This does not mean that surveys are not informative in product areas where counterfeits are of a more deceptive character. Here they may help to indicate the consumers' degree of counterfeit awareness, which is an important point to be considered when assessing the impact of infringements on affected parties.

7. Comparing survey results, there is evidence of large differences among countries with respect to the degree to which consumers knowingly and willingly will purchase infringing products. There is also evidence that, in addition to price, income and product availability are often factors influencing counterfeit purchases. The ready availability of counterfeit music or motion pictures, for instance, facilitates easy product access at low cost. Income, on the other hand, could play a key role in understanding the differences in counterfeit consumption patterns across countries.

8. *Producer/distributor surveys* can be an important complement to consumer surveys, particularly in product areas where awareness of counterfeiting goods is lacking. Such surveys can be directed both at producers, who might have done market investigations of their own with respect to counterfeiting of their products, and to distributors, who can give details about the sources and legitimacy of their stock. Producers of legitimate products, or their associations, may be acutely aware of counterfeit or piracy activity in their product area, and could therefore be valuable information sources.

9. *Sampling* is theoretically one of the most effective ways to develop information on the magnitude of counterfeiting and piracy. The cost and logistics involved, however, seem to greatly limit its practicality. The method is useful especially when measuring magnitudes of counterfeiting in product areas where infringements are deceptive; that is, not easily distinguished from genuine products.

Issues:

- How can the results of surveys be used to develop more effective models for measuring the magnitude, scope and effects of counterfeiting and piracy on affected parties? What are the principal concerns in this regard?

- How should issues related to consumer awareness be addressed when using survey results?

- How could the significant differences in behaviour and attitudes towards counterfeiting and piracy across countries be addressed in further work on measurement issues?

Economic modelling and other approaches

10. Economic modelling provides a promising means to use various types of information to develop frameworks for estimating counterfeiting and piracy in specific product sectors (as well as for larger product aggregates). The principal challenges concern *(i)* the selection of the information to be used in the models, *(ii)* the assumptions that need to be made in building the models, and *(iii)* the ways that the different pieces of information will be used in the models.

11. One of the approaches that has been commonly used is based on an estimation of total market demand for a product. Sales of "legitimate" products are deducted from the total demand figure to arrive at an estimate of counterfeit or pirated production. Estimation of total demand for a product, however, is not straightforward and can be approached using different methods. In the studies reviewed, for example, the software and music industries, and to some extent the motion picture industry, relied principally on the penetration and availability of closely related products (computer hardware, magnetic and optical disks, DVD-player penetration) to estimate counterfeiting and piracy of their products. A series of industry specific factors were used to refine the estimates, with further refinements made to take different conditions among countries into account. In the case of motion pictures, estimating techniques differ markedly between developed markets, partially developed markets, and markets where piracy is believed to be very high. For developed markets the approach relied on sampling.

12. Another approach of potential value regarding estimates of counterfeit magnitude is of a more econometric character. This method is primarily used for explaining differences in piracy levels across countries based on economic, technological and institutional factors. Relationships between these variables and piracy rates are established for countries where relatively good data on piracy are available. These relationships could then be used for estimating levels of counterfeiting and piracy in economies where data are lacking.

Issues

- For which products is modelling a promising approach for measuring counterfeiting and piracy? What specific methods should be used?

- How can the role of *(i)* sales of "related" products and *(ii)* sampling be further developed in modelling? What other types of indicators could be explored?

- To what extent and in what ways could sector-specific modelling be standardised?

- In what ways could the sector-specific modelling approaches be adapted to measure counterfeiting and piracy at more aggregate industry levels?

- In what ways might models have to be adapted to address the different types of IPR (*i.e.* trademark, copyright, design and patent rights)? Is there scope for modelling design and patent infringements?

- How could approaches using economic, institutional and technological variables to estimate counterfeiting and piracy be further developed?

II. Effects

13. Most studies of impact of counterfeiting and piracy on affected parties have focused on the direct effects of infringing products on the sales and profits of the rights holders. A critical element in such analysis is the degree to which consumers are aware that the products that they are purchasing are "fakes" and the assumptions made on the degree of substitutability between infringing and legitimate items. Much of the work that has been done assumes perfect substitutability. Significant differences in awareness and substitutability are, however, likely to exist from product to product.

14. While there is a great deal of anecdotal information on the direct effects of counterfeit products on health and safety, broader and more systematic research on this issue is almost non-existent.

15. In addition to the direct impact, counterfeiting and piracy can have significant indirect effects. These would include effects on GDP, employment, tax revenues, foreign investment, trade, and innovation. Most of the work that has been on this has focused on analysing the dynamic effects of reduced investments (caused by profit losses) on GDP, employment and tax revenues. Other research has focused on the effect of the strength of IPR on economic performance (*i.e.*, economic growth, foreign direct investment, trade and innovation). Although evidence is mixed, the studies show that strong IPR regimes generally tend to be associated with positive effects in all areas. There are indications, however, that these relationships differ both across countries and across industrial sectors, and may even be of no economic significance for low-income countries in some cases.

Issues

- How can better information on "substitutability" and "awareness" be developed and used in models assessing the effects of counterfeiting and piracy on affected parties?

- How could health, safety and security effects be addressed on a more systematic and comprehensive basis?

- What approaches and techniques could be employed to expand impact analysis to a broader range of other variables (such as effects on prices, costs, innovation, employment, consumer welfare, etc.)?

COUNTERFEITING AND PIRACY: MEASUREMENT AND RELATED STATISTICAL ISSUES

Background

16. The OECD has initiated a three-phase project to examine issues related to counterfeiting and piracy worldwide. The first phase of the project will cover the manufacture of products (*i.e.*, tangible items) that infringe trademarks, copyrights, patents or design rights. The second phase will cover digital piracy, while the third will address other forms of infringement of intellectual property *(i.e.*, notably geographical indications).

17. One of the key issues to be addressed in the first phase of the project concerns the methodologies and techniques that could be employed to measure the magnitude and scope of counterfeiting and piracy, and their effects. Although some global estimates have been made, most work that has been done has tended to focus on individual sectors.

18. In support of the work on measurement, the OECD and WIPO agreed to organise a joint workshop where experts could explore issues. This paper has been prepared to serve as background for this meeting. Its principal purpose is to review work that has already been done, and to identify key issues. The review is not exhaustive; indications of other studies and analysis that have been conducted on the issues considered would be welcome.

I. Magnitude and scope

19. No estimates seem to have been made of the total magnitude of counterfeiting and piracy worldwide. The most widely cited aggregate figure on infringements focus on their role in international trade. Counterfeit and pirated goods are said to have increased their share of international trade from 5 to 7% in recent years (around EURO 500 billion). The source of the estimate and the techniques or methodology that were used to calculate the figure are, however, unknown.

Nature of measurement challenges

20. The clandestine nature of counterfeiting and piracy means that statistics, if they exist, are often of poor quality, or based largely on custom seizures which are hard to relate to actual market figures. Thus, to understand the scope of the problem it is often necessary to base estimates on various data sources and use extrapolating techniques.

21. Moreover, the different types of infringements covered by the project raise different measurement issues and challenges:

- *trademark infringements*: infringing goods include items that have been produced to deceive purchasers into buying a "fake" item that may or may not have the same attributes as the "genuine" product and items that purchasers knowingly buy as "fakes"; production is often covert; both production and consumption are not easily measurable;

- *copyright infringements*: infringing goods, which are restricted to original creative works (such as literary, dramatic, musical and artistic pieces) could well have the attributes of "genuine" products, though the quality may sometimes be inferior to the original; given the low cost and

ease with which copyrights can be infringed, production is likely to be more decentralised and less easily measurable than for goods that have infringed trademarks;

- *patent infringements*: infringing goods include those that unlawfully exploit the inventions and product breakthroughs that are made by others; these goods do not necessarily infringe trademarks as they are often sold under other brand names; production may not be as covert as for goods that infringe trademarks;

- *design infringement*[1]: infringing goods are those that unlawfully exploit an original design of a product; given the relative ease of copying many types of designs, measurement is viewed as highly difficult.

Approaches to measurement

22. Data on counterfeiting and piracy activities can be developed using various methods and sources, each of which can contribute to the development of an overall understanding of the situation, albeit from different perspectives. As such, combining and confronting methods and results constitutes a potentially sound approach in estimating the magnitude of the activity. Information obtained through some of these methods can also be of value for estimating impacts. Following is a description of the four types of information that are available:

- *Enforcement information*. – Enforcement information would include information generated through physical discovery of infringing goods, and through legal actions taken against infringing parties.

- *Surveys and sampling*. – Survey information would include information generated through inquiries of producers, suppliers, consumers and other parties that would have relevant knowledge of, or experience with, counterfeiting and piracy.

- *Economic and econometric analysis and simulations*. – Economic and econometric analysis and simulations would include information that is generated through modelling and related initiatives, where relationships between supply and demand are examined and used to estimate infringement levels.

- *Anecdotal information*. – Anecdotal information would include information that surfaces gratuitously, such as reports on accidents or health problems precipitated by sub-standard counterfeit products, and "whistle-blowing" activities that signal the production or use of infringing products.

23. The balance of this report will examine the work that has been carried out in the first three areas. While anecdotal information can be important in uncovering IPR violations and demonstrating the existence of infringements in different sectors, it is not systematic and therefore is viewed as contributing relatively little to developing a more rigorous framework for assessing broader developments and trends.

[1] In some jurisdictions design rights are protected under patent laws.

A. Enforcement information

Physical discovery (through seizures and related enforcement actions)

24. Through their enforcement activities, law enforcement agencies are in position to collect and compile statistical information on the types of products being counterfeiting and pirated and the origin of the infringing products. The enforcement activities cover five areas – those that occur:

- at production centres, during the course of "raids";
- at distribution points (such as warehouses);
- at international borders, where customs officials can intercept infringing products that are in transit (both exports and imports);
- in markets where infringing products are sold (such as retail outlets and open markets); and
- with final consumers of infringing products (*i.e.*, individuals and firms).

25. The types of information available through enforcement activities in many instances share the shortcomings of "anecdotal" information and are not viewed as particularly useful as an indicator of current and evolving trends. The most systematic and promising element of the five would be the controls that occur at international borders. Apart from smuggled merchandise, all products are processed in one form or another by customs officials. However, given the resources and cost involved, the percentage of imports that are physically inspected is reportedly quite small; moreover, the information collected on seizures may not necessarily reflect the overall product or country-of-origin structure of trade in infringing products.

26. An example of the types of statistics that countries provide on seizures is shown in Table 1. The data show considerable variation in the relative importance and levels of products from year to year. Similar information is available is available on the origin of seized products.

Table 1: United States: Top IPR commodities seized in fiscal years 2003 and 2004

Commodity seized	Millions of US$		Percent of total	
	2003	*2004*	*2003*	*2004*
Wearing apparel	13.9	51.7	15	37
Cigarettes	41.7	24.2	44	17
Handbags/wallets/backpacks	11.5	23.2	12	17
Consumer electronics	3.8	8.9	4	6
Media	n/a	5.1	8	4
Toys/electronic games	1.5	4.0	2	3
Watches/parts	3.4	2.5	4	2
Batteries	n/a	2.3	n/a	2
Footwear	2.6	2.0	3	1
Computers/hardware	n/a	1.7	n/a	1
Other	15.6	13.2	8	10
Total	**94.0**	**138.8**	**100**	**100**
Number of seizures	*6,500*	*7,255*		

Source: US Customs and Border Protection.

Note: N/A not reported

27. Multilaterally, the World Customs Organization (WCO) has developed a framework through which seizure data could be collected from countries on a comparable basis, but it is apparently not used systematically by many countries; this has limited its usefulness.

Legal actions

28. Information on the magnitude and scope of counterfeiting and piracy is also available through legal challenges that are pursued against parties that are believed to have infringed an IPR. Such actions are dependent on *(i)* the ability of a party to discover the existence and source of the infringement, and *(ii)* the interest of the rights holder in initiating a challenge. The latter depends on a number of factors, including:

- the nature and magnitude of the effects of the of the violation on a firm;
- the time and expense involved in pursuing a legal challenge;
- the perceived chances for success; and
- the effects that a positive outcome are likely to have on the rights holder's situation.

29. Statistics on the number of formal complaints made for the different types of IPR infringements and the outcome of the cases pursued, appear to be available for a number of countries, as are statistics on other enforcement activities.

Comments on enforcement information

30. Seizures of products and arrests related to infringements provide one of the few sources of official statistics on counterfeiting and product piracy. These data are generally insufficient, however, for giving a clear picture of the overall size of counterfeit and pirate markets. This stems from the fact that the fraction of what is caught is unknown. Moreover, seizures and arrests depend heavily on the investigation process behind it. As these are often highly selective in order to increase time and budget efficacy, extrapolating from seizure statistics can be heavily biased.

B. Surveys and sampling

Consumer surveys

31. Surveys of end-consumers can be helpful in gauging the magnitude and scope of counterfeit and pirated products. Most of the surveys of this kind have been one-time initiatives; they are therefore not particularly useful in tracking changes in attitudes and behaviour over time. Moreover, as most of the surveys are conducted by independent contractors, often commissioned by different stake holders, the structure and elements of the surveys tend to differ from study to study. As a result the coverage of consumers, product types and geographic regions tends to vary between surveys, as do the questions posed.

IPTOC survey – Fake Nation?

(DVDs, music, CDs, digital games, fashion items, online intellectual property theft)

32. In England and Northern Ireland, a joint project between government, academia and industry surveyed more than 2,000 people in 2005 to obtain knowledge about end-users' attitudes towards, motivations for, and consumption of counterfeit and pirated goods (Bryce and Rutter, 2005). To broaden and deepen coverage both postal and web-based questionnaires were used, and nine focus groups were

formed. This structure enabled the development of detailed information on consumer practices and perceptions including associated risks, individual rationalizations, and the influence of demographic and product-related factors. Following these lines the study draws a picture of counterfeit purchases and pirate activity of DVDs, music CDs, digital games, fashion items, and online intellectual property theft.

33. The study found 34% of those surveyed had purchased counterfeit goods at one time or another; 13% had bought fakes believing they were genuine, and 3% were not sure if they had bought counterfeit products or not. Some 63% of respondents had never knowingly bought a counterfeit product, and while the majority of these said they were also unlikely to buy one in the future, 11% responded that they would probably do so. In terms of product areas, some 16% of those surveyed indicated that they had purchased counterfeit fashion items in the 12 months preceding the survey; while 16% had engaged in music piracy at least once during the period. Some 7% indicated that they had purchased counterfeit computer games.

34. Besides measures of magnitude, the survey also presents insights into the underlying motivations for counterfeit purchases. For instance, the majority of those who knowingly had bought counterfeit goods indicated lower product prices were a main reason. A large number of respondents justified their purchases by stating that the genuine product was too expensive, or overpriced, and that they would be able to increase their purchasing power by acquiring counterfeit products. Financial reasons for purchase, however, were not the only ones revealed by the study. The relatively high product quality of some counterfeit goods, for example, supported decisions to purchase such products. The ability to acquire a pirated product before it became generally available through legitimate channels was also a factor, in the case of movies.

35. The survey also contains information on why consumers do not purchase counterfeit goods. Over 40% of respondents cited the potentially harmful effects that counterfeit good might have as a reason for not buying counterfeit toys or counterfeit alcohol and cigarettes; this reason was cited by less than 10% of respondents in other product categories. The leading motivation for not buying counterfeit products in general, however, was the potential links to organised crime, with more than half of respondents indicating that this was the case for DVDs, music and alcohol and cigarettes.

36. Information is also presented on the channels through which counterfeit and pirated products are acquired. For DVDs, music CDs, and computer games the most frequent purchase locations were either while on holiday abroad (29%, 21% and 12%, respectively), or in pubs and social clubs (26%, 26% and 40%, respectively). Moreover, for music and computer games, downloads were more prevalent than hardcopy counterfeit purchases; except for movies, downloading was generally perceived as more acceptable than purchasing. Most people who had bought counterfeit fashion items had done so while on holiday (54%) and gave low costs (72%) and acceptable quality (60%) as the main reasons for their purchase. The study also found that fashion items generally suffer from the fact that people tend to judge whether a product is counterfeit by who is wearing it, and not by the product itself.

Gallup Survey

(Software operating systems, business software, entertainment software, music CDs, DVDs, alcohol, cigarettes, fashion items, jewellery; auto parts and tools; and pharmaceuticals)

37. Issues similar to those covered in the IPTOC survey were investigated by the Gallup Organization in the United States (Gallup, 2005). The 2005 survey focused on software operating systems, business software, entertainment software, music CDs, DVDs, alcohol, cigarettes, fashion items, jewellery, auto parts and tools, and pharmaceuticals.

38. Overall, 13% of the 1,304 respondents stated they had acquired counterfeit products during the previous year; 47% of these respondents said that they had not been aware that they had purchased a counterfeit product prior to their purchase. This effectively corresponds to a percentage of only 6% of respondents who knowingly acquired counterfeit or pirated products. In individual product categories, only one or two % of respondents reported having knowingly purchased counterfeit or pirated products; these percentages are significantly lower than those found in the IPTOC survey.

39. The Gallup survey also found that easy access to counterfeited products was a major reason for their purchase.

CEBR survey

(Clothing and footwear, perfume, toys and sports equipment, pharmaceuticals)

40. Further illustrating large survey result differences across countries is a survey conducted in England and Italy, as reported by the Centre for Economic and Business Research (CEBR, 2000). The survey covered clothing and footwear, perfume, toys and sports equipment and pharmaceuticals.

41. As the survey of the two countries parallel one another, they provide a good basis for cross-country comparisons. When asked if they would knowingly buy counterfeit or pirated products if the price and quality were acceptable, respondents replied as follows for the four product categories covered (Table 2):

Table 2: Percentage of respondents who would knowingly purchase counterfeit products

	England	Italy
Clothing and footwear	52%	76%
Perfume	16%	38%
Toys and sports equipment	5%	12%
Pharmaceuticals	5%	5%

Source: CEBR (2000)

42. The CEBR survey illustrates a significant difference in the willingness of consumers to purchase different types of counterfeit and pirated goods; many would buy clothing and footwear products that were not genuine products, while few would so in the case of toys and sports equipment and pharmaceuticals. The survey is also interesting with respect to the marked differences it shows in counterfeiting and piracy behaviour in two European countries; this raises interesting questions about potentially even bigger differences that might emerge if more economically and culturally diverse countries were analysed.

IBOPE survey - São Paulo

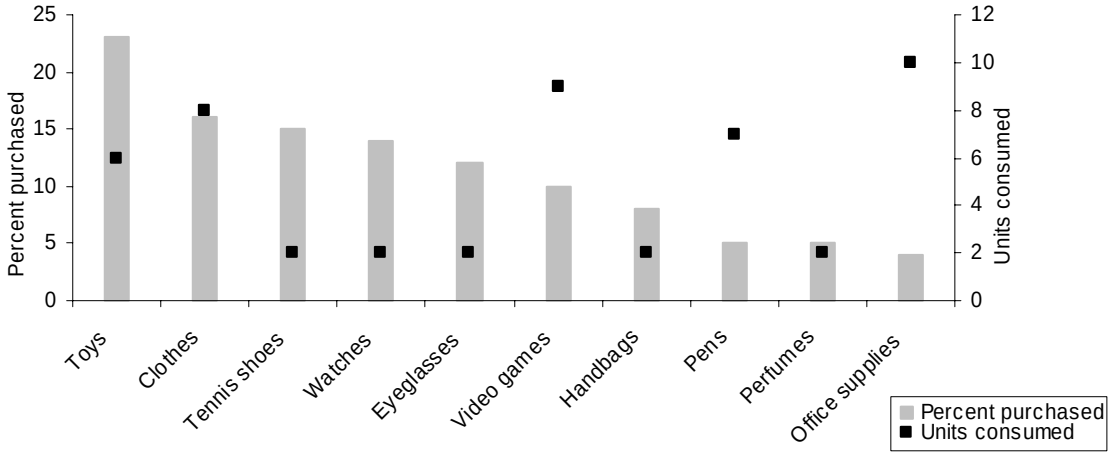
(Clothing, footwear, watches, handbags, eyeglasses, perfume, video games)

43. In connection with a study of measuring demand for fakes, copies and unlicensed goods among Brazilian consumers (Machado, 2005), the Instituto Brasileiro de Opinião Pública e Estatística (IBOPE) surveyed 602 inhabitants of the city of São Paulo. Products covered included clothing, footwear, watches, handbags, eyeglasses, perfume, and video games. The study differed from the studies discussed above as it investigated the intensity of counterfeit purchases. Thus, the survey participants were not only asked if they had purchased counterfeit and pirated goods, but also how many units they had acquired.

44. The survey indicated that 60% of the respondents had acquired a counterfeit or pirated product at one time or another. Moreover, of those who purchased a counterfeit or pirated product within the last year, 70% were aware of this prior to the purchase. This is a significantly larger proportion than the one reported in the Gallup poll for consumers in the United States. A Common reason for purchasing infringements was that famous brands profit tremendously from high prices and are therefore not hurt much by counterfeiting. Counterfeiting was also thought to create jobs in poor countries. Generally, pirated goods were perceived to cost half, or less than half, of the price of the genuine product. The study also indicated that younger consumers were more likely to purchase pirated products, and that belonging to a lower income group was particularly important for acquiring counterfeit clothes, toys, footwear and watches. Respondents in higher income groups, on the other hand, were more likely to purchase pirated video games.

45. Generally, the intensity of counterfeit purchases was considerably more pronounced for clothes, toys, video games and office supplies. The average quantity acquired for these products ranged from between 6 units for toys to 10 units for office supplies. Consumption density was particularly high for toys (23%), clothes (16%) and video games (10%); consumption intensity for other product types was two units (see Figure 1).

Figure 1: Consumption frequency and intensity of counterfeit goods



Source: Based on Machado (2005)

46. In a separate national survey, IBOPE found that some 29% of respondents indicated that they had purchased counterfeit clothing within a specified 12-month period, while some 16% indicated they had purchased counterfeit footwear.

Other

47. In a 2003 AC Nielson survey, some 17% of 1,400 survey respondents indicated that they had knowingly purchased pirated software within a specified 12-month period in Australia. Some 4% of 1,013 respondents to a survey conducted by the National Consumers League (NCL) indicated that they had purchased prescription drugs that they suspected to be counterfeit (NCL, 2004).

48. A number of studies and surveys have been done that have tried, on a systematic basis, to evaluate the relative importance of different factors (or determinants) in explaining the behaviour of consumers with respect to purchasing, or not purchasing, counterfeit and pirated items.

Cheung & Prendergast

(Video compact disc, clothing and accessories)

49. Cheung & Prendergast (2004a) developed a profile of buyers of pirated products (including video compact discs (VCDs) and clothing and accessories) in China. They base their work on information obtained from a focus group in the Wuhan province, and through interviews with more than 350 buyers of counterfeit and pirated products. Information drawn from the focus group included data on buying location and the price, quality, supply, and range of infringing products. Interview respondents were sampled according to quota sampling, with age and gender as bases[2]. All interviewees, who had purchased infringing VCDs, clothing/accessories, or both, within the previous six months, were given a questionnaire containing questions on purchasing behaviour (*i.e.* what they bought, how often, why, and how), and demographics (gender, marital status, age, education, occupation, personal income, and family income).

50. The authors found that individual purchase magnitudes of pirated VCDs was positively and significantly correlated with tertiary education, young age groups, males, and single marital status. For clothing/accessories only gender (women) was significantly related to magnitude. In another study Cheung & Prendergast (2004b) looked at purchasers of counterfeit and pirated goods in Shanghai and Hong Kong, concluding that although high-magnitude purchasers score higher on a materialism-score in Shanghai relative to Hong Kong, the measure does not correlate with counterfeit and pirate consumption within the cities. This could indicate that pirate buying behaviour could be region-specific. Other literature suggests that pirate buying behaviour also is product-specific (*i.e.* see and Swee, et *al*., 2001).

Siponen & Vartiainen; Holm

(Computer software, music)

51. Siponen & Vartiainen (2002) surveyed students at Oulu University in Finland who had committed unauthorised copying of computer software. They found that copying is positively correlated with the male gender, but that attitudes toward pirate copying did not depend on gender. Furthermore, they found that stealing tangible products (in this case a candy-bar) was seen as more serious a "crime" than copying software. Personal income does not seem to be a factor. Similar results were found in a survey covering both music and software piracy at Lund University in Sweden by Holm (2003). The results are in contrast with those of Cheung & Prendergast above.

Harvey & Walls

52. Harvey & Walls (2003) use an experimental framework where individuals must decide to purchase original products or counterfeits in a controlled laboratory market. Individuals base their decisions on given prices and expected penalties associated with counterfeit products, and are compensated in real money according to performance. In the study they compare university undergraduates from the University of Hong Kong and the University of Nevada at Las Vegas and find that counterfeit purchases in the Las Vegas sample are more price and penalty elastic than in the Hong Kong sample. On average, over different sets of prices and penalties, Hong Kong students therefore bought relatively more counterfeit goods.

[2] In *quota sampling*, the population is first segmented into mutually exclusive sub-groups, from whom subjects are then selected.

Producer surveys

53. Like consumer surveys, producer and distributor surveys tend to be one-time initiatives that are therefore often not useful for tracking changes over time. The type of information obtained is generally of a broad and indirect character. In relation to counterfeiting and piracy, for instance, most producer surveys ask manufacturers about their perception of the scope of the problem, and to what extent their firms have suffered economic losses. While companies may have very good ideas of these matters, the general nature of such questions does not lead to detailed answers.

PriceWaterhouseCoopers – Global

54. PriceWaterhouseCoopers has conducted surveys of economic crime since 2001. In this work they have covered Europe (2001), East Africa (2002), and Ghana (2002). However, only their most recent survey from 2003 (Global Economic Crime Survey) deals explicitly with counterfeiting and piracy. Based on 3,600 interviews in more than 50 countries, some 24% of the responding companies identified product piracy and counterfeiting as one of their major challenges over the next 5 years. The potential problem is perceived to be of a larger magnitude in the Asian Pacific region (24%) followed by Africa (18%) and South and Central America (18%). Problems are also significant, however, in North America (14%), Central and Eastern Europe (14%) and Western Europe (13%).

Deloitte & Touche

(Russia: beverages, tobacco, luxury items, toiletries)

55. With a focus related more to the economic impact suffered from counterfeiting and piracy, Deloitte & Touche (1999) undertook a survey of manufacturers in Russia. The work was done by an informal association of manufacturers called the Brand Protection Group and focused on 22 specific products comprising of categories such as beverages, tobacco, luxury items, and toiletries. The economic impact was measured through revenue losses incurred by companies, and tax and revenue losses incurred by the Russian Federation. Overall, total revenue losses were estimated at USD 473 million, of which the tax and other revenue losses to the Russian Federation were estimated at USD 174 million.

56. To arrive at the estimates above Deloitte & Touche employed a number of tools including surveys, focused interviews and market research. The methodological framework of the study is not, however, described fully. From the research report it seems that the economic impact measures have been calculated first by estimating the magnitude and sales impact of counterfeit products based on individual company interviews, and then by up-scaling these measures based on the market shares of the survey participants.

Swiss Federal Institute of Intellectual Property

57. In 2004 The Swiss Federal Institute of Intellectual Property (SFIIP) conducted a survey of 72 companies to ascertain the extent to which counterfeiting was affecting them both at a national and international level. All companies were based in Switzerland. The study covered design, copyright, patent and trademark infringements, as well as mislabelling of country of origin. In addition to separate analysis of each type of infringement, the study provided an overview by industry. Of all the companies, 46 (64%) stated that they were affected, and of these 39 indicated specific cases in the previous 12 months. The most common problem cited was trademark infringements, followed by design, copyright, country-of-origin mislabelling, and patent violations. The majority of companies stated that they were either affected or seriously affected in each of the areas, except for patent infringements. Infringement incidents of all types were felt to be most severe within the Western European countries, followed by Asia and Eastern Europe.

Although the study also inquired about company losses stemming from counterfeiting and piracy activities, most firms were unable to provide information on this aspect due to estimation difficulties.

Sampling

58. For a broad range of products it may be relatively easy to determine whether items are genuine or not. Infringements may be identified by close inspection, or be strongly indicated by the environment in which items are sold. Some counterfeit and pirated products, however, are sold with the goal to deliberately deceive buyers. These infringements have a potentially high cost to the consumer, as the quality and properties of the product are not known until consumption or usage. Examples of deceptive counterfeits include medicine, alcohol, tobacco, and a wide range of replacement parts (*e.g.*, for autos). To establish measures of magnitudes for these goods, sampling of goods at retail/distribution points or with end users may be helpful.

World Health Organization

(Drugs)

59. The World Health Organization (WHO) has in the past estimated counterfeits to make up between five and eight percent of the world market. Later estimates by the United States Food and Drug Administration (FDA), however, indicate a larger share of around 10%.[3] The problem is particularly acute in the developing world which, according to WHO, account for 60% of the known cases of counterfeit medicine. Parts of Asia and Africa where poverty, lack of drug regulation, and weak law enforcement is common are hardest hit. Here anti-malaria, antibiotics, and tuberculosis and HIV/AIDS medicines are all targeted. However, other countries are not immune to the influx of counterfeit pharmaceuticals, especially given the increase in the use of the Internet to market pharmaceutical products. Existing surveillance of the problem is not uniform across countries and there is generally a lack of case reporting. Moreover, defining what is counterfeit, and what is not, is complicated by large amounts of substandard medicine in the market[4]. Determining the magnitude of counterfeit drugs is therefore extremely difficult, and few studies have attempted to do so.

60. Some studies have, however, been made. In 1999, the WHO conducted a study on counterfeit drugs in cooperation with the Ministries of Health of Myanmar and Vietnam (WHO, 1999). It involved the collection of background information on the status of drug regulation through questionnaires, and the sampling of selected products that met the following criteria; 1) the drug was listed on the country's list of essential drugs, 2) there was a high consumption rate for the drug, 3) the drug was of therapeutic importance, and 4) the drug was likely to be counterfeited (based on previous reports). The resulting sample was then subjected to both laboratory quality testing and investigation.

61. Twelve products were examined in the two countries. Of the 503 samples taken, 500 were subjected to laboratory testing for the presence and contents of active ingredients. To assert whether or not the drugs were counterfeited, 214 of the 500 articles were chosen for inspection, however, replies were received for only 169. The total number of counterfeits was found to be 6 (3.6%). The remaining 163 were all reported as genuine although 18 (11%) failed the laboratory test, five were mislabelled with respect to their source (country of manufacture and name of manufacturer) but passed the test, and one contained the wrong ingredient but was produced by a licensed manufacturer. Of the 45 articles for which no reply was

[3] See http://www.fda.gov/oc/initiatives/counterfeit/qa.html (last accessed October 6, 2005). Details on the methodology behind the estimates of counterfeit drug prevalence are not available.

[4] Substandard medicine refers to genuine and legitimate drug products which do not meet the quality specifications set for them.

received 10 (22%) failed the laboratory test, but it was not possible to determine if they were counterfeit or not.

62. Due to a relative small sample size, the WHO cautions against any conclusions being drawn from the study.

Pfizer

(Pharmaceuticals)

63. In 2000, Pfizer, one of the world's largest research-based pharmaceutical companies, commissioned a market survey of the Chinese pharmaceutical market (*i.e.* see Clark, 2003). The study which was limited to seven major cities in China was undertaken by a consulting firm with experience in Asia; it involved the sampling of several Pfizer medications. Due to its popularity and potential risks concerning health and sales losses, a special emphasis was put on Viagra. At the time of the study, sales and dispensing of Viagra was restricted to certain larger metropolitan hospitals, and thus five of these were included in each city. However, samples were also collected at unauthorized outlets such as sex shops and smaller retailers. Of the Viagra products obtained outside authorized hospital distribution channels 88 percent were found to be counterfeit.

Russian Ministry of Health

(Drugs)

64. Evidence on counterfeit drugs in other countries is also available. One example is the Russian Ministry of Health who has attempted to quantify the problem in Russia. According to Forzley (2003) the Ministry found that the prevalence of counterfeit medicine increased by a factor 10 during 1998-2000, and that 3.6% of the drugs in the market were counterfeit.[5]

US Federal Drug Administration

(Food, medicine)

65. In the United States, the Federal Drug Administration (FDA) samples food and medicine to ensure their quality and safety. The FDA believes that counterfeited drugs are not a widespread phenomenon but they have recently reported more counterfeit activities, and their number of investigations has increased (FDA, 2004). However, most evidence on the magnitude of counterfeit drugs stems from media reports on specific incidents or investigations, and the scope is therefore hard to determine.

Comments on surveys and sampling

66. Surveys can be conducted on consumers, producers, or distributors depending on the research objective, and may prove valuable not only as a first hand observation of the magnitude but also as inputs in more sophisticated impact measurement models. The general concerns associated with the use of surveys, however, apply. Such surveys are sensitive to the way questions are constructed, as well as the willingness of respondents to tell the truth.

[5] A later survey of pharmaceutical manufacturers operating in the Russian market has estimated the counterfeit market share to 12% (CIPR & AIPM, 2002). This estimate was based on the average of industry executives' best professional estimates.

67. *Consumer surveys* can provide useful insights into the demand and actual consumption of counterfeit goods by analyzing the willingness of consumers to acquire counterfeit goods, and the circumstances under which they do. Attitudes toward counterfeiting, although indirectly related to the willingness to acquire, could be problematic for certain products, *i.e.* software. Other insights from the surveys above can be drawn. Firstly, although one should take care in comparing survey results, there seem to be large differences across countries regarding the product types consumed, consumption levels and the extent to which consumers knowingly purchase counterfeit and pirated goods. Secondly, counterfeit goods are acquired through different channels that vary according to the products involved. Third, most surveys tend only to address whether people have bought counterfeit goods or not, though the intensity of consumption is an important factor concerning magnitude and impact effects. Fourth, factors such as product availability and individual income seem to affect demand for counterfeits differently across product types. The ready availability of counterfeit music or motion pictures, for instance, facilitates easy product access at low cost. Income, on the other hand, could play a key role in understanding the differences in counterfeit consumption patterns across countries. Finally, one must note that survey results depend on the consumers' actual awareness of infringements in the product area under investigation. This does not mean, however, that surveys are not informative in product areas where counterfeits are of a more deceptive character. Here they may help to indicate the consumers' degree of counterfeit awareness, which can play an important part for measuring the impact of the phenomenon.

68. *Producer/distributor surveys* can be an important complement to consumer surveys, particularly in product areas where awareness of counterfeiting goods is lacking. Such surveys can be directed both at producers, who might have done market investigations of their own with respect to counterfeiting of their products, and to distributors, who can give details about the sources and legitimacy of their stock. Producers of legitimate products, or their associations, may be acutely aware of counterfeit or piracy activity in their product area, and could therefore be valuable information sources.

69. *Sampling*, or mystery shopping, can be used to develop information for products where infringements are not easily detected. By purchasing samples from different stores and retail outlets, and letting experts determine the nature of the products afterwards, insights into the more hidden counterfeit and pirate markets can be gained. This is often used for pharmaceutical products, alcohol and tobacco.

C. Economic modelling and other approaches

70. The magnitude and scope of counterfeiting piracy can also be measured indirectly, using economic modelling and related methods. The typical indirect analysis is conducted by estimating the total market for the product in question (*i.e.*, the demand for both genuine and infringing products). The supply of legitimate products is then subtracted from total demand to arrive at an estimate of counterfeited products in the market. While the logic of this approach is sound, estimating actual product consumption may be cumbersome.

Business Software Alliance

71. The Business Software Alliance (BSA) has studied trends in business software piracy using the same overall methodology since 1994. As such, they have built up a consistent time-series of software piracy data covering a number of countries.

72. The methodology is based on an evaluation and comparison of software demand and supply. Total demand for new business software, or in BSA terminology 'the total software load', is estimated and compared to software that is sold legitimately by suppliers. The difference between the two is attributed to counterfeiting or piracy. The data used to estimate both total software demand and the legitimate supply was until recently provided by BSA members. Since 2003, however, in an effort to broaden country

coverage of piracy rates an independent firm, IDC, has been commissioned to conduct the analysis. While specific aspects of the methodology have therefore changed, the general framework has not.

73. IDC relies on two factors when estimating total software demand; 1) the number of hardware units in the market, and 2) the software loads on hardware units. The number of hardware units is determined from PC shipment tracking data generated from suppliers and collected quarterly by IDC from over 65 countries.[6] To control for potential differences in software loads according to hardware type, the IDC categorizes PC shipments in two dimensions, home-PCs vs. non-home PCs, and new PCs vs. replacement PCs, thus yielding four categories. Only desktops, laptops, and tablet PCs are included in the shipment data; server units and handheld devices are therefore excluded.

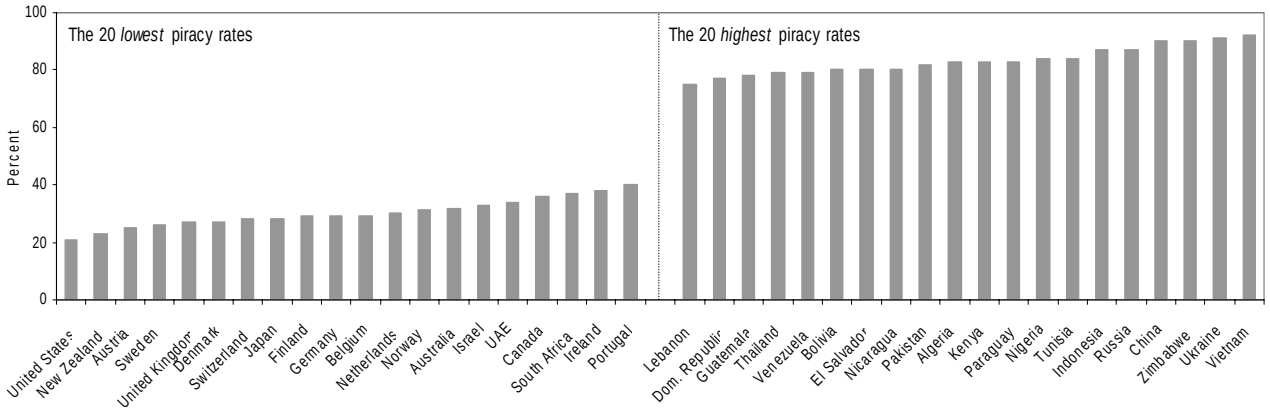
74. Total software load is measured by multiplying the hardware units by a unit software-install base, which is determined through consumer and business surveys covering 15 countries.[7] The unit install base for the remaining countries is found through survey result extrapolations. To account for differences in the install base that may follow from PC type differences, IDC distinguishes between software on new computers, new software on existing computers, software obtained from retired computers, software obtained for free (*e.g.* shareware and open source), and software that runs on Windows and non-Windows platforms. Combined with the estimate of hardware units, the total software-load in each country is then calculated.

75. The software piracy magnitude is derived from the difference between the total software load and the total legitimate software supply. To estimate the latter IDC uses two basic inputs for each country; 1) the country's software revenues, and 2) the average PC system value of the country. Software revenues are determined through IDC's own software tracking data, vendor and channel interviews as well as local analysts. For countries not covered by IDC, the data are either collected in-country, or estimated based on an IDC 'rest-of-region' model. The average PC system value is meant to capture the average value of the legal software installed on the PC systems in the country. Due to variations in software prices depending on software products, the system value accounts for differences between, and within, five software categories: collaboration, office, security, operating systems, and other. The software prices used to determine the system value is gathered from IDC's price trackers and a variety of other sources including country surveys, analyst spot checks and interviews with vendors and other distribution channels. Legal software supplies are then determined by dividing software revenues by the average PC system value. Finally, the amount of pirated software is derived from the difference between the total software load and legal software supply, whereas the piracy rate is the amount of pirated software as a percentage of the legal software supply. Figure 2 provides an overview of the most recent software piracy estimates in 40 countries. Worldwide, the IDC estimated that in 2004, some 35% of all purchased business software was pirated product.

6 For an additional 20 countries, the data are either collected in-country, or modelled regionally.

7 Countries for which surveys are conducted include China, Malaysia, Taiwan, Spain, Romania, Brazil, Bolivia, Chile, Colombia, Mexico, Costa Rica, Dominican Republic, Guatemala, Kuwait, and the United States.

Figure 2: Software piracy rates in 2004



Source: BSA (2005)

Entertainment Software Association

76. The Entertainment Software Association (ESA) publishes piracy rates for entertainment software. These rates are calculated by comparing an estimate of the total number of games in use with the sales of legal copies. The total number of games in use is calculated using data on the presence of game-playing hardware in the market – the estimation framework is therefore similar to that of business software. Focusing only on machines for home-use, the number of games in circulation is derived from industry data providing separate estimates on games per PC, handheld computers and different types of game consoles insofar as they differ in at least three key areas; price per game, ratio of games per platform, and data sources.

77. Legal sales are estimated through collected sales data. Due to the approximate character of the estimates, the ESA notes that data validation has been attempted using several alternative data sources. These include public information such as population, seizures of counterfeit and pirated goods, articles in the trade press, confidential industry and company reports related to game and hardware use, and sales data. In addition, expert opinions from representatives of ESA's member companies, which are either close observers of local market conditions, or corporate staff with responsibilities in the area of designing, implementing and monitoring company piracy assessment and enforcement efforts, are consulted.

78. Estimates of piracy rates that were provided to the US Government for a number of countries are provided in Annex I.

Motion Pictures Association

79. Estimates of counterfeiting and piracy rates of motion pictures have been made by the Motion Pictures Association (MPA). So far these estimates have focused only on hard copy duplicates such as illegal video tapes, VCDs and digital video discs (DVDs); they therefore exclude internet-related piracy. A shift in methodology in 2005, however, is aiming also at including internet infringements.

80. The methodology employed by MPA in measuring piracy magnitudes is generally based on sampling estimates, but differs according to market type. These are developed markets, partially developed markets, and "full pirate" markets (*i.e.* markets where piracy is dominant).

81. Piracy rates for developed markets are based on sampling from stores that rent or sell motion pictures. To calculate an estimate for the country concerned, the average number of pirated motion pictures found by sampling from rental shops and vendors is multiplied by the total number of movie rental shops and vendors selling motion pictures. These results are reviewed in the light of local market knowledge, and data from anti-piracy activities. According to the IIPA (2005), piracy rates in full pirate markets is based either on the number of blank media tapes sold in the country or by the number of VCR, VCD or DVD players in the country. The approach is thus based on the potential capacity for supplying and watching pirated motion pictures.

82. Annex I provides estimates information on the levels of piracy in various countries. In close to half the number of countries covered, piracy rates were estimated at over 50%.

International Federation of Phonographic Industry

83. The International Federation of Phonographic Industry (IFPI) publishes piracy rate indications for recorded music. These are based on several data sources collected from IFPI national group affiliates. Not all countries, however, are able to provide data at the same level of detail. The range of available data therefore differs across countries. For North America, Europe and Asia most countries provide legitimate sales statistics, seizure data, and investigator reports, *e.g.* by customs and excise authorities. Data availability for Latin American countries is more limited; only legitimate sales statistics are provided on a consistent basis. Research on consumer consumption is also provided by a number of countries.

84. The data collected from IFPI national group affiliates are used by the organisation to evaluate the overall picture of the piracy situation, which is then analysed taking a series of other data into account; this includes data on manufacturing capacities of optical and magnetic discs, patterns in seizures, and economic indicators. From this several piracy scenarios are laid out for both countries and regions, and the most likely ones are selected on a consensual basis by IFPI experts. The piracy scenarios selected must therefore be seen as an interpretation of indicatory data based on the industry's perception of the piracy situation.

85. The IFPI estimates that about 33% of global music disc sales are pirated. Data on the situation in different economies is presented in Annex II.

Other modelling

86. Econometric modeling may be used for estimating counterfeiting magnitudes and can be done in two ways. In the first, demand for legitimate products in a reference country (where counterfeiting levels are known to be relatively low) modelled, and the resulting model estimates are used to predict the legitimate demand in other countries. Actual sales are then subtracted from predicted sales to obtain an estimate on the level of counterfeiting. IN the second, piracy rates for countries such figures are known are regressed on key economic, institutional and technological variables, and the resulting model estimates are then used to predict piracy rates in countries where these are unknown.

87. While the first approach is rarely used, the second has been applied mostly to explain differences in piracy levels across crosses. An example of this is research done on software where piracy rates (as estimated by BSA) have been related to a number of economic, institutional and technological factors (Table 3). The studies suggest that economic development, often measured by GDP per capita, is negatively related to software piracy. Trade dependency, which can be interpreted as a proxy for IPR enforcement (*i.e.* stemming from international pressure to deal with IPR issues in connection with trade negotiations), also has a negative effect on software piracy rates, which is also the case for bilateral investment treaties. Individualism is often hypothesized to have a negative effect on piracy in the literature. This follows from the fact that "individualistic" cultures tend to view piracy as an exchange of articles, whereas more "collectivistic" cultures tend to emphasize the sharing of goods and services. The work that has been done along these lines could be applied to help develop counterfeiting and piracy estimates, in particular for countries where data is non-existent.

Table 3: Underlying factors of software piracy

	Holm	Husted	Marron & Steel	Andrés	Depken & Simmons	Bezmen & Depken	Shadlen et al	Shadlen et al
Economic factors								
Income	--	---	(-)	---	(-)	--	--	--
Income growth						++		
Income ineqality		---						
Inflation					--	(+)		
Trade dependency					-			--
Labor force participation					(-)			
Institutional factors								
Judicial institutions	--		--	---				
Government effectiveness							(+)	
Bilateral investment treaties								--
Education			(+)	--			--	--
Freedom index				(-)		--		
Power distance		(+)			++			
Individualism		---	--		--			
Masculinity		(-)						
Uncertainty avoidance		(-)						
Technological factors								
Research & Development							++	
Internet users						--		
Countries in sample	*75*	*39*	*49*	*24*	*65*	*77*	*80*	*80*
Adjusted R-squared	*0.667*	*0.830*	*0.810*	*0.760*	*0.736*	*Not reported*	*Not reported*	*Not reported*
Software piracy data used	*2000*	*1996*	*1994-1997*	*1994,1997 and 2000*	*1994*	*1995,2000, and 2002*	*1994-2002*	*1994-2002*

Note: -,--,--- and +,++,+++ indicate significance levels at 0.1, 0.05 and 0.01, respectively. Signs in ( ) are reported as insignificant.

Counterfeit currency

88. While counterfeit financial instruments, including currency, are not explicitly covered by this report, the techniques that have been used to measure the magnitude and scope of counterfeiting activities may be relevant, to the extent that these techniques could be adapted to other product areas.

89. The body of literature devoted to measuring the amount of counterfeit money in circulation is relatively well established. A recent study conducted by the US Federal Reserve Board (Judson and Porter, 2003), uses three sets of data to develop upper and lower bounded estimates on the amount of counterfeit US currency in circulation worldwide:

- the amount detected through physical screening conducted by the Federal Reserve;

- reports by the US Secret Service, which is responsible investigating, prosecuting, and preventing counterfeiting activity; and

- institutional information developed through discussions with foreign banking authorities.

90. The study concludes that USD 12-108 million in counterfeit currency could be in circulation, with USD40-50 million being the "most plausible" level. This translates into USD 0.60-0.80 per USD 10,000 in circulation (0.006-0.008 %). In terms of physical units, the study estimates that 1 or fewer counterfeit items per 10,000 currency items (0.01%, or less).

91. The situation with respect to counterfeit money, however, differs from counterfeit goods in several ways, which would need to be kept in mind when examining ways the techniques used could be adapted. One of the most important is that, unlike most counterfeit goods – which are essentially removed from circulation once they are sold, counterfeit currency remains in circulation and is reused until it is detected. Moreover, counterfeit products are not subject to the same type of systematic examination that the Federal Reserve carries out on currency. For these reasons, detection rates are likely to be far more precise and "scientific" for currency than for other products.

Non-observed economy

92. The non-observed economy refers to economic activities that are often missing from official data sources that are used to compile national accounts. Typically, this would include transactions that are underground, illegal or informal. Production of counterfeit and pirated products that are carried out clandestinely would fall under this category. To date, measures of the illegal economy have typically focused on a rather narrow range of activities. These include the production, import, sale and consumption of illegal drugs; prostitution; theft; smuggling; and occasionally trade in illegally produced audio and video products (UN, 2003).

93. While the system of national accounts is broadly used in estimating legal non-observed activities, this is generally advised against when estimating illegal activities due to their clandestine nature (OECD, 2002). Instead, direct methods for estimating are suggested. This would include information collected from police, health authorities and custom authorities, crime statistics, public opinion polls, and experts' estimates.

94. Only a few OECD countries estimate the level of illegal activities, and none of these provide separate statistics pertaining to counterfeiting and piracy. Due to EU requirements, several transition countries now make regular estimates, but these cover only drugs, prostitution, smuggling, and fencing. One exception is Estonia, which also includes estimates on the production of counterfeits audio-video products. Since counterfeit audio and video products are mainly bought by tourists, the sales magnitude is calculated based on the number of tourists, the estimated number of purchases, as well as the quantities confiscated by the police. Combining this with information on import prices and intermediate costs, the value added in illegal trade of audio-video tapes, CDs, and software was estimated to 118 million Kroons in 1997 (USD 8.5 million) (Dedegkajeva & Leetmaa, 2000).

Comments on economic modelling and other approaches

95. Economic modelling provides a promising means to use various types of information to develop frameworks for estimating counterfeiting and piracy in specific product sectors (as well as for larger product aggregates). The principal challenges concern (i) the selection of the information to be used in the models, (ii) the assumptions that need to be made in building the models, and (iii) the ways that the different pieces of information will be used in the models.

96. One of the approaches that has been commonly used is based on an estimation of total market demand for a product. Sales of "legitimate" products are deducted from the total demand figure to arrive at an estimate of counterfeit or pirated production. Estimation of total demand for a product, however, is not

straightforward and can be approached using different methods. In the studies reviewed, for example, the business software, entertainment software and music industries relied principally on production and sales of closely related products (computer hardware and magnetic and optical disks) to estimate counterfeiting and piracy of their products. A series of industry specific factors were used to refine the estimates, with further refinements made to take different conditions among countries into account. In the case of motion pictures, estimating techniques for developed markets, partially developed markets and markets where piracy is believed to be very high differ markedly, relying, in the case of developed markets, on sampling.

97. Magnitudes of counterfeiting may also be estimated by econometric modelling. In general there are two approaches. In the first, legitimate demand is modelled for a reference country (in which counterfeit levels are known to be low). Using the resulting estimates, legitimate sales are predicted for other countries and compared to data on actual sales. In the second, piracy levels are modelled for a number of countries with relatively good data and the resulting estimates are then used to predict piracy levels for countries where piracy levels are unknown. While the first approach is rarely employed, the latter is primarily used for explaining country differences in piracy levels (*e.g.* by economic, institutional and technological factors) rather than predicting them.

II. Effects

98. A second measurement challenge to be addressed in the project concerns the methodologies and techniques that could be employed to assess the effects of infringements on affected parties, which include consumers, IPR rights holders and governments. The elements that need to be considered in developing a comprehensive framework are multi-faceted, covering health, safety and security, as well as economic effects (Table 4).

Table 4:– Framework for assessing the effects of IPR infringements on affected parties

Effects on consumers: - health - safety/security - welfare (effects on prices, consumer confidence, etc.)
Effects on IPR rights holders: - prices - costs (costs of defending rights, developing and deploying integrating protections against infringements) - sales revenue and sales volume - value of the firm (share prices, etc.) - investment - innovation - workers/employment - consumer - image
Effects on economies/governments: - law enforcement costs - tax receipts - public integrity (bribery, corruption, intimidation of public officials) - terms of trade
Effects on economies where counterfeiting is significant: - jobs, production, etc. - level and scope of criminal activities (including organised crime) - labour, including child labour - international trade - international investment - development of branded products and innovation
Effects on parties infringing rights: - economic and legal risks - other effects

99. As suggested by the table, the impact of counterfeiting takes a number of different forms. While consumers may benefit from lower prices, they may be hurt by acquiring a product of inferior quality that may in some cases suffer serious health and safety risks. Companies may be hurt by losing sales, goodwill or image. Moreover, firms incur costs through legal lawsuits and other costly activities directed at combating counterfeiting. Governments may be hurt due to lost tax revenues following from lower sales by manufacturers of genuine products, and from the lack of tax payment by the counterfeit producers. Costs are also incurred from enforcing laws related to counterfeiting and piracy. The parties that infringe IPR benefit, to the extent that they can deceive consumers into paying a premium for substandard products and/or to the extent that they can produce good quality infringing products at relatively low cost; these benefits have to be weighed, however, against the legal and economic risks that are incurred.

Sales and profits

100. Most of the work that has been done on the direct effects of counterfeiting and piracy has focused on the effects on the sales and profits of firms. The models that have been employed all employ a similar underlying framework. This involves a comparison of revenues or profits in two different market states; one in which counterfeiting exists, and one in which it does not. The difference then measures the impact. Annex III provides a description of the main elements of the framework.

Feinberg and Rousslang

101. Feinberg & Rousslang (1990) was one of the first studies to produce a comprehensive estimate of profit losses due to infringements of trademarks, copyrights, and patents. The basis of the study was a company survey conducted in 1986 by the US International Trade Commission. The survey covered 244 US firms of which 99 provided estimates on worldwide sales of infringing versions of their own products, and 199 reported expenditures on identifying violations of IPR and costs of enforcing them. Eighty companies reported on both infringement levels and identification/enforcement costs.

102. Using the approach outlined above, the study simulates two markets – one in which counterfeit products are present, and one in which they are not. Limited data were, however, available, as only 45 companies provided sufficient information on market shares held by infringements, associated sales values, and the data required for estimating demand elasticity.

103. Companies in the sectors analysed are categorized into five broad industry groups; *i)* entertainment and publishing, ii*)* other consumer related, *iii)* computer related, *iv)* industrial and transportation, and *v)* extractive, natural resources and chemical products. The worldwide sales of the companies covered in these industries totalled USD113.2 billion in 1986 prices. The impacts of infringement estimated by the model used are presented in Table 5.

Table 5: Effects of IPR infringements on selected industries

	Profit losses		**IPR protection costs**		**Consumers' surplus gain**	**Profits to infringers**	**Sample size**
	Percent of world sales	Millions of $US	Percent of profits	Millions of $US	Millions of $US	Millions of $US	No. of firms in sample
Entertainment	*3.60*	79.2	*3.10*	2.5	58.1	70.3	*9*
Computer	*2.60*	1671.0	*1.50*	25.5	1608.4	930.0	*10*
Consumer	*0.70*	73.4	*8.70*	6.4	34.4	69.9	*9*
Industrial	*1.30*	253.5	*1.80*	4.7	232.7	168.5	*12*
Extractive	*0.05*	7.6	*10.30*	0.8	0.6	7.6	*5*
Total	***1.80***	**2084.7**	***1.90***	**39.8**	**1934.2**	**1246.3**	***45***

Source: Feinberg & Rousslang (1990)

Note: All figures, except those in *italics*, are USD millions (1986 prices).

104. Overall, total lost profits were estimated at USD2.1 billion, or 1.8% of worldwide sales. There is nevertheless considerable variation across industries, with the entertainment industry experiencing the highest level of lost profits, while consumers gained USD1.9 billion. Profits to infringers were less than the loss to legitimate producers, but varied significantly among sectors.

105. It should be noted that the values calculated in Table 5 depend crucially on how competing counterfeited products affect the prices of legitimate producers. The calculation requires good information on supply and price elasticities, which are difficult parameters to estimate. Also, the quality of counterfeit products is not taken into account, nor are the health and safety related costs that consumers could incur in purchasing counterfeit and pirated products. Substandard products could significantly diminish any consumer benefits. Finally, the model is a partial equilibrium model and thus gives estimates for static welfare changes only. Dynamic effects such as effects on investment from infringements are therefore not considered.

International Trademark Association

(Apparel, footwear)

106. A study commissioned by the International Trademark Association (INTA) (1998) estimated how counterfeiting affected revenues for trademark owners in the apparel and footwear industries. The study, which was conducted by Wharton Economic Forecasting Associates (WEFA), follows a market demand model under which consumer demand is estimated separately for both industries. As in the Feinberg & Rousslang study, it is assumed that the availability of counterfeit goods reduces the market for legitimate goods by an equal amount for all prices (*i.e.* results in a residual market), which inflicts costs on legitimate producers in terms of lost sales. The impact is thus calculated by comparing sales that would have occurred if counterfeit goods were not present, with actual sales. As the actual level of counterfeiting is unknown, determining the size of the market without counterfeiting is, of course, a difficult exercise in and of itself.

107. While the INTA study makes no direct assumption as to the level of counterfeiting, it does posit the existence of a relationship between industry revenues and the degree of trademark protection. The primary data sources for the estimation exercise are legitimate (*i.e.*, non-infringing) sales data, as well as indicators for the strength of trademark protection in the industries covered. Data on revenues were provided by INTA member surveys (10 usable responses out of 46 questionnaires); the trademark protection index used to proxy counterfeiting, was obtained through a survey of 230 attorneys with experience in the area; the surveys covered both legal and enforcement issues. As such the model essentially estimates the impact of trademark protection on industry revenues (see Box 1).

Box 1 -- Description of methodology employed in the INTA study

To obtain measures for revenue impacts the INTA study used panel data on sales covering 40 countries over 1992-1995, which was pooled to increase estimate consistency. Industry revenues were then estimated by regressing revenue per capita on the trademark protection index while controlling for income per capita, the average price of trademarked goods in the country, and consumer preferences, where the share of total consumer expenditure on the products in question (*i.e.* apparel or footwear) served as proxies. Four interaction terms were introduced to take into account country variances in the trademark protection index stemming from income per capita, average trademark product prices, consumer expenditures on industry products, and the size of the country. Moreover, fixed effects were included to account for revenue variations across companies.

Using the pooled data, the direct effect of trademark protection on sales in both the apparel and footwear industries was found to be positive but insignificant.[8] However, a negative and significant effect from trademark protection interacted with country size was found[9]. Using a simplified model, coefficients were estimated only for income per capita; the company fixed-effects and the trademark protection variable interacted with country size. The latter was estimated at -0.25, which given the logarithmic specification of the regression equation can be interpreted as the elasticity of sales revenue relative to trademark protection[10] (*i.e.* see Appendix). From the simple construction of the trademark protection variable which takes values between 1 and 5 (lower numbers referring to higher protection), and the assumption that a score of 1 is associated with zero counterfeiting, the maximum possible revenue loss from the model would be 33% (see Annex IV for further details). As such, employing the country trademark protection scores WEFA calculated the revenue impact and the associated dollar value based on 1995 sales figures for the 10 companies. Across all countries, average sales losses were found to be 22% (+/- 4%t), with a corresponding value of USD2 billion (1995 prices).

108. The INTA study concludes that, across all countries, average sales losses for the ten firms covered were 22% (+/- 4%), with a corresponding value of USD2 billion (1995 prices).

109. The approach taken in the study makes no direct assumptions as to the level of actual counterfeiting. In the model, counterfeiting is only a factor affecting legitimate sales and can therefore reflect direct counterfeit product and price competition, loss of company goodwill, etc. However, the study relies on two other assumptions which could be critical. The first is the fact that counterfeiting affects the legitimate market demand equally regardless of the price of genuine products. The second is the assumption of a consistent relationship between the trademark protection variable and actual counterfeiting magnitude. Also of note is the fact that the coefficient on trademark protection was found to be insignificant over the period 1992-1995 when using the full model.

8 This was also the case for *p* and *c* (see Appendix), probably caused by the short time period. However, the effect of the interaction between trademark protection and country population, *n*, was negative and significant, albeit small. This gives some indication that a low trademark protection in combination with a large country, say, affects sales per capita relatively more negatively than it would have had the country been small.

9 A variable interaction is basically the product of two explanatory values. In this case, since trademark protection interacted with country size is negatively associated with sales, there is an indication that weak IPR protection has a larger negative effect on sales in larger countries than in smaller ones.

10 In this case, for instance, a 10% increase in the trademark protection variable would have an impact on sales revenue of -2.5%

CEBR study

(Clothing and footwear, perfumes and cosmetics, toys and sports equipment, and pharmaceuticals)

110. The CEBR study described earlier in this report also analysed the effects of counterfeiting on revenues and profits in the four industries covered (*i.e.*, clothing and footwear, perfumes and cosmetics, toys and sports equipment, and pharmaceuticals). The general approach is similar to that of the previous two studies in the sense that impact is measured by comparing actual market estimates with those of a simulated "counterfeit-free" market. However, instead of relying entirely on product demand estimates as in INTA (1998), CEBR specifies and estimates the legitimate demand and supply for each industry.

111. As an initial phase, the slopes of the demand and supply curves are estimated for each industry by regressing data on actual sales volume on total disposable income and an overall retail price index for legitimate demand, and on an index of industry costs for legitimate supply. Relating demand and supply, the two regression equations jointly include the retail price index of the industry by which the slopes of the two curves are estimated. When the slope estimates are obtained, the model is calibrated, or fitted, to data on sales volumes and prices over 1995-1998 to estimate the curve intercepts or constants (see Annex IV for details). From this the actual market demand and supply model emerges, in which counterfeit goods are present, and industry revenues can be estimated.

112. To estimate industry revenues in a counterfeit-free market situation, CEBR uses data on the likely level of counterfeit goods in each industry. This is obtained from the Anti-Counterfeiting Group in the UK, and from the Association des Industries de Marque (AIM) for the rest of the EU. The model assumes that the amount of counterfeit goods is transferred to the legitimate industry on a one-to-one basis. From this "counterfeit-free" industry revenues are estimated. The difference between the revenue estimates stemming from the counterfeit-free market, and those of the actual market thereby denotes the loss of revenues due to counterfeiting. Given that genuine and counterfeit goods are not necessarily perfect substitutes, these revenue losses are likely to be exaggerated. To take this into account, CEBR adjust the estimated losses according to the degree of substitution revealed by consumer surveys.[11] Applying marginal profitability ratios across the aggregated revenue losses suffered by each industry in the EU, CEBR also estimated the impact of counterfeiting on industry profits (see Table 6).

Table 6: Annual revenue and profit losses due to counterfeiting

	Annual lost revenues		Annual lost profits
	Percent of total revenue	Millions of EUR	Millions of EUR
Clothing and footwear	3.2	7,581	1,266
Perfume and toiletries	7.2	3,017	555
Torys and sports goods	11.5	3,731	627
Pharmaceuticals	5.8	1,554	292
Total		**15,883**	**2,740**

Source: CEBR (2000)

Note: Lost revenue and profit in EUR millions (1998 prices).

113. The CEBR study offers an interesting method for estimating the impact of counterfeiting. While many studies tend to equate the estimated quantity of counterfeit goods to the quantity of lost sales, few studies adjust the resulting losses for the degree of substitution between genuine and counterfeit products. Yet, this is an important aspect since the impact of counterfeiting otherwise would be overstated. One must bear in mind that in most cases, fake products are not perfect substitutes for their genuine counterparts, and

[11] Respondents were asked whether they would knowingly purchase a range of counterfeit goods.

even if they were, some consumers would never acquire a genuine product due to pure cost considerations – even if no fakes were available at a lower price.

Charles River Associates

(Pharmaceuticals)

114. On behalf of the Pharmaceutical Research and Manufacturers of America (PhRMA), Charles River Associates Inc. (CRA, 2001) analyzed the costs to research-based pharmaceutical companies of losses from sales of products by competitors which essentially were illicitly infringing on the data exclusivity rights of other firms.[12] The losses were estimated in four countries: Argentina, Brazil, India and Israel. Similar to the CEBR study, the modelling methodology compares the observed market equilibrium, in which both legitimate and infringing products are sold, to a simulated equilibrium assuming that only legitimate products are sold. However, the analytical framework, which is outlined in Annex IV, is different.

115. To estimate revenue losses, CRA first randomly sampled a set of molecules[13] (ingredients in pharmaceutical production) that embodied protected IP and were sold in the countries under investigation. Based on data collected for the identified molecules, revenue losses were estimated following the CRA's economic model, and then extrapolated to the rest of the molecule market. The economic model assumes that both legitimate and infringing products are sold in the market, and that manufacturers of both product types have similar production technologies. Based on these assumptions, the price that maximizes the profits of legitimate producers is derived and then estimated. The estimation is based on sales, or expenditure, data on legitimate and infringing products obtained from surveys conducted by IMS, estimates of the demand elasticity of the molecule in question and an estimate on substitution between the legitimate and infringing product.

116. Given the price for the molecule in question, set by the legitimate producer, and the corresponding quantity sold, revenues can be calculated. These revenues reflect the effects on sales of infringing products. The revenues are then compared to a simulated estimate of what revenues would have been in the absence of infringing products. The difference between the two revenue levels represents an estimate of the revenue impact of the infringing products. Table 7 lists CRA's impact results when extrapolated across the entire molecule market for each country.

Table 7: Revenue impact from infringing products

	Lost revenue		**Lost returns to investment**	
	Million of $US	(Std. dev)	Million of $US	(Std. dev)
Argentina	491.4	80.2	261.6	57.8
Brazil	459.2	78.2	324.5	58.9
India	976.7	22.2	729.0	36.2
Israel	104.4	12.0	71.8	9.5
Total	**2,031.7**	**114.8**	**1,386.9**	**90.7**

Source: CRA (2001)

12 Data exclusivity protection refers to the market access procedure that drugs abide to enter the market. This means that producers of drugs who are not covered by the data exclusivity protection must provide their own data supporting its safety and efficacy to the administering health agency.

13 CRA samples over the full range of molecules that embody IP protection based on IMS's lists of molecules sold in countries, and FDA's lists of patented molecules. To ensure representativeness, the sample consists of 15%of the entire molecule market.

Business software, entertainment software, music, and motion pictures

117. Based on the estimates of counterfeiting and piracy magnitudes provided by BSA for business software, ESA for entertainment software, IFPI for recorded music, and MPA for motion pictures, the respective industry associations provide estimates of impact effects.

118. Industry losses to the business software industry are calculated by using the known size of the legitimate market and using the piracy rate to derive the retail value of the software that was illegitimately acquired. Hence, BSA assumes a one-to-one relationship, or perfect substitutability, between pirated software and lost legitimate sales.

119. The ESA take a different approach in valuing piracy's impact on the entertainment software industry. Instead of calculating the retail value of the pirated copies they estimate the expenditures on pirated products. In effect, this approach corresponds to measuring the impact on legitimate revenues based on consumers' budgets. To obtain a broader picture of the situation, however, ESA also estimates the piracy market using wholesale prices as reported by game publishers.

120. The IFPI follows the same general approach as ESA in their estimates of the impact of piracy on the music industry, whereas the motion picture industry (MPA) bases its estimates of losses on wholesale prices. At the moment, it has not been possible to obtain impact measures for the various OECD member countries except for the business software industry. The ESA publishes impact measures in the IIPA 'special 301' submission, but these generally cover countries outside the OECD area.

Table 8: Impact measures for business software and recorded music

Industry	Revenue losses 2004 Millions of $US						
	Global	*European Union*	*Rest of Europe*	*North America*	*Latin America*	*Asia Pacific*	*M. East/Africa*
Business software *	**32,695**	12,151	2,313	7,549	1,546	7,897	1,239
- percent of sales	*35*	*35*	*61*	*22*	*66*	*53*	*58*
Entertainment software (US) **	**3,000**						
- percent of sales	*n/a*						
Motion pictures (US) ***	**3,000**						
- percent of sales	*n/a*						
**Recorded music ** **	**4,600**						
- percent of sales	*14*						

Source: Based on BSA (business software), Deloitte (entertainment software and motion pictures), and IFPI (music)

Note: * Retail price base, ** Pirate price base, *** Wholesale price base. All figures based on hard-copy piracy rates. Figures for entertainment software and motion pictures are 'minimum quotes' and apply to losses incurred by US companies only.

121. Based on music piracy data from 1994-1998 data obtained from IFPI, Hui & Png (2003) analyze the effect of piracy rates on music sales in 28 countries. They estimate the impact of piracy on legitimate sales to be around 6.6%, which is significantly lower than the rate estimated by the industry (*i.e.,* see Table 8). The estimates, however, could be underestimated given that legitimate prices probably would have been higher if there had been no music piracy.

Health and safety

122. While there is a great deal of anecdotal information on the effects of counterfeit products on health and safety, relatively little has been done to measure the effects more broadly. One of the reasons for this is that statistics are not readily available (Forzley, 2003). Few governmental databases that are concerned with public health, injuries, illnesses, and consumer product safety, whether on a local or a national basis, provide for the specific collection of data on counterfeit-related incidents. This makes systematic identification of counterfeiting related public health effects virtually impossible. Internationally,

the World Health Organization (WHO) maintains a database on counterfeit drugs, which is based on information provided by member countries, but less than 5% of the 191 members report (Forzley, 2003).

Forzley

(Pharmaceuticals, aircraft and auto parts, consumer goods and tobacco)

123. One of the few studies that seek to address the health and safety related impact of counterfeiting is Forzley (2003). She looks at relevant material and available data uncovered through an extensive review of available information. Covering a year span from 1995 to 2001, these sources include, but are not limited to, anecdotal evidence, media reports, industry/association releases, as well as organization and government reports and studies on all types of actual human injury associated with any type of counterfeit good. Using US and EU customs seizure data as an indicator of the most commonly counterfeited goods with potential adverse health effects, Forzley focused on pharmaceuticals, aircraft and auto parts, consumer goods and tobacco. To ensure source validation, all information was screened using six criteria including 1) the identification of a specific product, 2) a specified injury or illness, 3) a reported place of incidence occurrence, 4) the number of persons affected, 5) the date of the incidence, and 6) the source of a traceable report. Despite the number of years, only a few reports (21 of 120) could be validated on at least four of these criteria. A summary of these are presented in Table 9.

Table 9: Adverse health effects from counterfeit goods

	Location	Injury	Number of incidents	Date
Pharmaceuticals				
Insulin	Volograd, Russia	Hospital admission	1000	2001
Birth control pills	Brazil	Unwanted pregnancy	12	1998
AIDS triple cocktail	Brazil	Panic	120	1998
Androcur	Brazil	Death	10	1998
Fake drugs - unspecified	China	Death	192000	2001
Viagra	China	Unsatisfied customers	On-line customers	2001
Seostim	US	Swelling/rash	Some patients	2000
Meningitis vaccine	Niger	Death	2500	1995
Medicines	Vietnam	Death (adults)	27	1997
Baby powder	Vietnam	Death (chrilden)	300	1997
Alcohol				
Liquor	Vietnam	Death (adults)	100	1997
Vodka	Russia	Death	22	-
Wine	Egypt	Death	1	1996
Vodka	UK	Blindness	1	1999
Beer bottles	China	Death	Dozens	-
Alcohol	China	Death	Dozens	Each year
Food/Nutritients				
Dietary supplements	Texas, US	Adverse reaction	Complaints	2000
Enfamil	US	Illness	2	2000
Food sprayed with banned pesticides	China	Death	69	1999
Consumer goods				
Washing powder	UK	Can cause burns	None cited	2000
Cigarettes	China	Headacke	Unspecified	-

Source: Based on Forzley (2003)

124. In 2000 the leading cause of injuries followed by death in the US was auto accidents. It was also the third leading cause of non-fatal injuries. Forzley analysed these incidents, finding no information on the role counterfeit parts might have played. As for aviation, the FAA tracks data on counterfeit aircraft parts to some extent but does not track associated injuries. Most of the information on these aspects of counterfeiting is therefore only obtainable by media reports and other forms of anecdotal evidence. Using the National Transportation Safety Board (NTSB) database which contains information on annual accident

reports on the civilian aviation and other transportation industries in the US, Forzley found that in 1998 counterfeit parts were identified in incidents or crashes in which 110 persons were injured.

Comments on direct impact analyses

125. Despite their theoretical foundation, direct impact models suffer from the obvious critique that assumptions regarding the counterfeiting magnitude must be drawn. This is the case whether the model uses the 'likely' magnitude of counterfeiting, the sales value of counterfeit products relative to genuine, or if it posits some relationship between the counterfeiting magnitude and IPR.

126. A critical element of direct impact analysis is the degree to which consumers are aware of, or suspect, a product's counterfeit nature prior to purchasing it. The models by Feinberg & Rousslang (1990) and INTA (1998), for instance, are useful in situations where genuine and counterfeit products are identical, by appearance, or perfect substitutes, but probably less so if this is not the case. Because consumer awareness enables the deliberate choice of acquiring a genuine or a counterfeit product, it also relaxes the perfect substitutability between the two. Effectively this means that consumers will only purchase a genuine product if the difference between its value to them and its market price is higher than their value of the counterfeit product and the price by which it can be acquired. A consumer will therefore judge the quality of the goods prior to the purchase, but will also be motivated by more complex influences stemming from moral considerations and cultural norms. These factors need to be taken into account in assessing impacts.

127. Consumer awareness is also important in other respects. For example, for product types where consumers cannot distinguish between genuine and fake products, counterfeit products are likely to have adverse effects on the reputations of legitimate producers, and result in a loss of goodwill. This would not be the case if consumers were aware or even suspected, that a product being purchased was counterfeit (Shapiro & Grossman, 1988). It is therefore important to distinguish between *deceptive* and *non-deceptive* counterfeit products, or operate with different impact intensities of counterfeiting conditional on the degree of consumer awareness. This is also the case if one looks at the health related impact of counterfeit goods.

128. Direct impact on sales also depends on the responsiveness of legitimate demand to price changes (*i.e.*, the demand elasticity. In general, low prices and high availability of similar products create demand responsiveness, and slight changes in a product's price may lead to large changes in product demand. This affects the slope of the legitimate demand, and potentially the impact due to infringements. Also of importance is the supply elasticity for counterfeit products.

Indirect impact

129. In addition to the direct effects on producers, consumers and governments, counterfeiting and piracy can have a number of important indirect effects on economies. It is often argued, for instance, that weak IPR regimes and low enforcement (*i.e.* high tolerance of counterfeiting and piracy) may have negative effects on an economy's foreign direct investments, international trade and innovation. Other negative dynamic effects follow from lower investments due to reduced profits. However, weak IPR protection has also been argued to have positive effects. A high tolerance for counterfeiting and piracy, for instance, can promote knowledge spill-over, especially in less developed economies that depend more on imitation than innovation to promote economic growth and enhance social welfare. Proponents of this view have often drawn attention to the value that good quality patent-infringing drugs that are sold at relatively low prices can have for low-income countries, and the value that low-cost pirated productive software and books can have for persons who would otherwise not have the means to buy and use these goods (*i.e.* see Dutfield, 2003 for an overview). Others have argued that strong IPR may deter firm entry due to excessive market power rather than spur incentives for new innovations (Gilbert & Newbery, 1982; Maskus, 2000).

Economic growth

130. The change in economic structure from one relying heavily on physical capital to one that builds increasingly on knowledge and information has spurred increased interest in the value of intellectual property as a driver of economic growth. A number of studies have examined how IPR protection and growth are related. Gould & Gruben (1996) use Summers & Heston cross-country data[14] and study the effects of patent protection[15] on average yearly economic growth over 1960-1988. They find a significant positive effect of the strength of patent protection on economic growth – especially for open economies. They also find, however that IPR may have a weaker effect in uncompetitive and closed economies.

131. Similarly, using average yearly growth of GDP over 1970-1985 for 112 countries, Rushing & Thompson (1996) find that stronger patent protection may contribute to economic growth, but only for countries above a certain income threshold. More recent studies find evidence that the impact of IPR on economic growth is non-linear or state-dependent. For instance, while strong patent protection may stimulate growth in countries that have reached a high level of development, this relationship does not hold for middle-income countries (Falvey et *al.*, 2004). According to the Falvey study strong patent protection also appears to have a positive impact in the least developed countries – presumably since such protection stimulates knowledge transfer through other channels. Middle income countries have often gained imitative capabilities that can offset, at least partly, the positive impact of IPR protection.

132. Industry-focused studies on the impact of IPR violations on economic growth include the work of Bezmen & Depken (2005) which focuses on software piracy. Covering three years; 1995, 2000, and 2002, the study relates software piracy (based on BSA estimates) to economic development in 77 countries, using the United Nation's Human Development Index (HDI). Bezmen & Depken use two-stage regression approach in which software piracy first is instrumented using various macroeconomic values, and where the HDI then is regressed on software piracy, Simon-Fraser's economic freedom index[16], and GDP per capita. The results suggest that software piracy affects economic development negatively, at least in the short run.

GDP and employment

133. The CEBR study mentioned earlier (CEBR, 2000) analyzed the impact of counterfeiting on investment, employment and GDP for the EU. To estimate the impact of on investment for the industries covered, the average rate of return on capital invested across the EU is used. Combined with the reduced rate of profits estimated in the study, CEBR found that in order to achieve the same rate of return the companies in the four industries would have to scale back investment by a total of approximately 20 billion EUR over the period 1995-98. With this loss of investment as a basis, CEBR applied their own macro-economic model of the European economy to simulate the resulting impact on employment and GDP.

134. In the model, the total loss of investment was treated as quarterly negative shocks to investment expenditures over the period covered. These were all assumed to be of equal size amounting to 978 million EUR per quarter. From this, reductions in GDP and employment were calculated (Table 10).

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14 Also referred to as the Penn World Table which has been widely used for studies on economic growth.

15 Gould & Gruben base their patent protection index on an index developed by Rapp & Rozek (1990). They also use IV estimation to account for measurement error in the index and possible endogeneity problems and obtain similar results. The index of Rapp and Rozek (1990) is based on the adherence of each country's patent laws in 1984 to the minimum standards proposed by the US Chamber of Commerce. These standards include guidelines for patent examination procedures, term of protection, compulsory licensing, coverage of inventions, transferability of patent rights and effective enforcement against infringement. The index is on a six-point scale with higher numbers indicating stronger IPR protection.

16 The economic freedom index is published annually by the Fraser Institute.

Table 10: The macro-economic impact of counterfeiting in four industries (1995-1998)

Industry	Investment reductions Millions of EUR	GDP reduction Millions of EUR	Employment reduction Number of jobs
Clothing and footwear	n/a	3,462	7,280
Perfume and toiletries	n/a	1,637	3,520
Torys and sports goods	n/a	2,001	4,370
Pharmaceuticals	n/a	937	1,960
Total	**19,558**	**8,037**	**17,130**

Source: CEBR (2000)

Note: Investments and GDP impact are in EUR millions (1995 prices). Employment is the number of jobs.

135. As can be seen from the table, the reduction in investment is estimated to have a negative impact on GDP across the EU area of 8 billion EUR, and a reduction of some 17,000 jobs in the four industries.

Allen Consulting Group

(Toys, software, computer and video games)

136. The Allen Consulting Group (2003) employs a forecasting model[17] on the Australian economy with a focus on the toy, software, and computer and video games industries. Using a macro-economic model (MMRF-Green) for the country they predict the effects of a drop in counterfeited products of 33% over a five year period. The model assumes that a drop in counterfeiting will shift consumer expenditures from counterfeit products to legitimate products, and that this will result in an increase in the level of investment undertaken by the three industries, and in the economy as a whole.

137. An interesting, but only moderately important result of the forecast is a negative effect on the economy from the shift in consumer expenditure. This is explained by the fact that as consumption is directed towards legitimate products, import dependency, particularly on software, increases. In the long run, *ceteris paribus*, this results in currency depreciation, and thereby increases Australian exports. However, since the foreign-currency price of Australian exports falls, and the foreign-currency price of the country's imports, by assumption, stays unaffected, the terms of trade decreases. In turn this has a negative effect on the economy. The overall effect of reduced counterfeiting, however, is positive and driven by increasing investment.

138. Under the model, the impact of the 33% decline in counterfeiting is to increase GDP by 41 million AUD per year, which in present value terms corresponds to 466 million AUD. Moreover, following these gains are increased government tax revenues of 34.4 million AUD per year, with a corresponding present value of 487.2 million AUD. Similarly, employment in the covered industries is predicted to increase by 403 full- and part time jobs by the end of the 5-year period. Put in relation to macro-economic variables, *i.e.* GDP and total employment in the industries, the effects appear to be relatively small, economy-wide.

[17] Forecasting is typically based on modelling the effects of a given drop in counterfeiting over a given period; it is therefore in principle more hypothetical in nature than models which attempt to measure actual impacts. In reality, however, due to the little known magnitude of counterfeiting, the difference between the two is not great. Forecasting models typically assume that a drop in counterfeiting affects consumption and investments in a specific way, and analyzes the effects of these changes on the economy using standard economic models.

IDC

(Software)

139. A similar study on software piracy conducted by IDC (2003) on Australia examines economic effects more broadly. Using a somewhat different approach than Allen Consulting Group (details on the methodology employed are not available), IDC projects the effects of a reduction in business software piracy of 10% points (37%) from 2002 to 2006. The study concludes that the reduction could boost Australian GDP by 4.1 billion AUD, increase tax revenues by 437 million AUD, and create 7,000 jobs.

140. The IDC study of Australia is part of a larger study commissioned by the BSA. This work analyzes the effects of a software piracy reduction for 57 countries over a four year period. The model applied provides forecast figures for reductions of software piracy of 5, 10 and 20 percentage points based on a "piracy impact model" utilizing data on the economic impact of technology (Table 11).

Table 11: Annual impact on GDP, employment and tax revenues from reductions in software piracy

	Impact on GDP Millions of $US			**Impact on Employment** Number of jobs			**Impact on tax revenues** Millions of $US		
points of piracy reduction	*5*	*10*	*20*	*5*	*10*	*20*	*5*	*10*	*20*
Western Europe	17,987	22,822	59,986	27,024	50,677	90,126	4,432	5,618	14,783
Eastern Europe	2,292	2,798	6,042	7,298	12,320	18,952	162	200	458
North America	29,645	37,731	100,192	19,477	36,698	65,776	4,736	6,111	16,003
Latin America	1,276	1,604	4,114	3,430	6,348	11,049	123	154	395
Asia-Pacific	34,730	42,272	78,448	183,289	275,108	371,816	3,089	3,783	7,341
Middle East / Africa	924	1,179	2,979	1,511	2,798	4,882	82	103	268
Global	**86,854**	**108,405**	**251,761**	**242,028**	**383,949**	**562,600**	**12,622**	**15,968**	**39,248**

Source: Based on IDC (2003)

Note: Impact measures are *per year* over a four year period (2002-2006)

141. According to the IDC estimates, a drop in software piracy of 10 percentage points over a four year period would cause an increase in worldwide GDP of USD433 billion, create more than 1.5 million jobs, and lead to increased tax revenues of almost USD64 billion.

International trade

142. High levels of counterfeiting and piracy activity may have a negative effect on international trade and investment, and thereby indirectly impede economic growth. This could be of particular importance in regions where domestic research and development sectors are either underdeveloped or non-existent (OECD, 2003).

143. Maskus & Penubarti (1995) studied the effects of IPR protection on trade. Covering 28 manufacturing sectors in 1984, they use trade data from 22 OECD countries to 71 destination countries. The IPR measure follows that of Rapp & Rozek (1990) and thus relates to the strength of patent protection. Maskus & Penubarti find that stronger patent protection has a positive and significant impact on bilateral imports into both small and large developing countries with the strength of impact being more pronounced in the larger countries. From their results, however, it appears that trade is more influenced by patent protection in industries where patents are less important.

144. Fink & Braga (2005) use a gravity model to study the effects of patent protection on bilateral trade flows. They use data for non-fuel and high technology trade in 1989 over an 89x88 country matrix. The gravity model follows a standard setup in which trade that flows from country *i* to *j* depends on GDP and population of both countries, the geographical distance between the two, a dummy to indicate whether

a common border is shared, and a dummy that indicates if languages are the same. Dummy variables for preferential agreements (*e.g.*, the EU, NAFTA, ASEAN) are also included. To study how IPR affects bilateral trade flows Fink & Braga use an IPR index developed by Park & Ginarte (1997)[18] and look specifically at how IPR affect the imports into countries. For non-energy trade flows, Fink & Braga find that strong IPR has a positive significant effect on the probability that two countries will trade with one another (both imports and exports), and a positive significant effect on bilateral trade flows. For high-technology trade, however, stronger IPR is associated with a negative significant probability of trade between countries. The direct effect on high-tech imports is also negative, albeit insignificant. Since one would expect the role of IPR to be bigger on high-tech trade, the authors note that this rather surprising result could suggest that stronger market power may offset the positive market expansion caused by stronger IPR, and that stronger IPR may cause high-tech firms increasingly to serve foreign markets through FDI. Moreover, the omission of tariff and non-tariff barrier variables may have biased the results. As such, there seem to be a trade-off between the IPR related market expansion, and the monopolistic firm behaviour that strong IPR may motivate.

145. With a special emphasis on developing countries, OECD (2003) analyzed the impact of IPR on both trade and FDI. The level of IPR is proxied by an index indicating the strength of a country's patent rights similar to those of Ginarte & Pink (1997) and Park (2001). The study covers 156 countries for the period 1990 to 2000; both national data and data disaggregated by industry are analysed. The analysis considers three groups of countries; all countries (156), developing countries (83) and least developed countries (17). By regressing the trade flows of the countries (import and export flows are treated separately) on the index of patent rights, and controlling for country risks,[19] tariff rates, income per capita, as well as fixed-effects for individual countries, it is found that strong IPR generally has a positive but modest impact on trade. Looking only at the least developed countries, and countries under development, this result, however, does not hold – except for a positive impact on imports in developing countries. Exports in pharmaceutical and the computer & office equipment industries are positively affected by IPR in developed and developing countries, but computer & office equipment exports are negatively affected in the least developed countries. As noted in the study, one reason for this could be that domestic patent reform reduces the ability to export product infringements.

Innovation

146. It is often argued that strong IPR protection stimulates incentives to invent and innovate. As such, it is likely that high levels of counterfeiting and piracy may discourage innovation, and therefore indirectly undermine economic growth. There is some empirical work that supports this view. Using panel data for 32 countries over 1981-1995, Kanwar & Evenson (2003) find that strong patent protection has a positive effect on R&D expenditures (which is used as a proxy for innovation). Looking at significant changes in patent policies over 60 countries, Lerner (2002) finds that the strengthening of patent protections had some positive effect on the number of filed patent applications. However, when controlling for changes in the patenting environment, such as the negative effect of the great depression in the 1930s, the effect of increased patent protection on domestic applications was actually significantly negative. The effect on foreign patent applications, on the other hand, was strongly positive. The latter result is confirmed on U.S. firm level data over 1982-1999 by Branstetter et *al.* (2004). There is little information, however, on how patent protection might affect R&D expenditure in developing countries.

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18 Ginarte & Park (1997) grades national IPR regimes of 110 countries on a scale from zero to five. The index [GPI] includes ratings over five different categories including 1) extent of coverage, 2) membership in international patent agreements, 3) provisions for loss of protection, 4) enforcement mechanisms, and 4) duration of protection. Shares of 'fulfilled' criteria are computed for each category using several benchmarks and country scores are calculated as the sum of shares over all categories.

19 The risk ratings were based on those published by the PRS Group in the *International Country Risk Guide*. The country risk ratings are a composite of political, financial and economic risk ratings.

Foreign investment

147. Foreign direct investment may play an important role in technology and knowledge transfer. Even if technology is kept within a foreign firm, domestic firms may still enjoy spill-over effects stemming from the presence of the multinational firm through its local market participation. The undertaking of foreign direct investment, however, depends on the associated risks of technology leakage and product infringements; high counterfeiting and piracy rates can therefore discourage investments and direct them elsewhere. Even if the empirical evidence whether FDI leads to positive spill-over effects is mixed[20] it seems to depend on the characteristics of the economic environment (OECD, 2003; Görg & Greenaway, 2004). The impact of counterfeiting and piracy rates on the economy through their effect on FDI could therefore well be country and sector specific.

148. From a survey of 94 major US firms covering 6 industries Mansfield (1994) found that IPR protection was a key concern for companies when they established R&D centres, while it was of less importance in establishing sales and distribution outlets. Also, while chemical and pharmaceutical companies generally regarded strong IPR regimes as important, the individual industries' evaluation of IPR regimes across different countries showed little correlation. While no studies have investigated the relation between counterfeiting and piracy and FDI directly, there is a body of empirical literature exploring the effects of IPR regimes on FDI, *i.e.* see Dutfield (2003) for an overview. The results, however, are mixed and suggest the need for more detailed context dependent analysis.

149. The OECD (2003) study, which studied the impact of IPR on trade as mentioned above, also analyzed its effects on FDI over the same period (1990-2000). Following the same approach as with trade, the study found that economies with stronger patent regimes had higher levels of FDI; the relationship was stronger for the least developed developing economies. This suggests a positive effect of strong patent rights, but with a diminishing tendency as a country's economic structure evolves. As such, a strong IPR regime is not necessarily associated with increased FDI, and may even hinder such international transactions if they result in excessive market power to the intellectual property owners. For instance, newer theories suggest that strong IPR can concentrate researchers in a smaller number of competitive industries and thereby create narrower R&D fields. This could increase the likelihood of duplication, make R&D more inefficient, and direct foreign capital elsewhere (Horii & Iwaisako, 2005). The OECD study also suggests that the relationship between stronger IPR and investments vary by industry. For instance, in industries such as computer services, finance, and chemicals and pharmaceuticals, FDI is sensitive to IPR regimes. This was not the case for the metals, machinery, and transportation sectors. It is noteworthy to mention that other factors affect the level of FDI to a country.

Comments on indirect impact

150. If one accepts a linkage between the strength of IPR regimes and the actual level of counterfeiting and magnitude in an economy, important information about product infringements and their dynamic effects may be gained. The body of literature on IPR and its effects on economies is large, but most studies focus entirely on the impact of patent rights, and the evidence that is provided is relatively mixed. As such, clear conclusions are hard to draw. Strong IPR regimes are however often associated with positive effects on economic growth, although a certain income level, or economic and institutional capacity, seems to be a prerequisite for this relationship. Evidence on how IPR regimes affect international trade, innovation, and investments is also mixed and not abundant with respect to developing countries. There are strong indications, however, that the role of IPR and their dynamic economic impacts are largely context dependent. That is, effects could differ across countries and industrial sectors.

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[20] See *i.e.* Görg & Greenaway (2004) for an overview of empirical literature.

151. Dynamic impacts can also be addressed through the investment reductions caused by lost profits. The positive side of this approach is that traditional macro-economic models can be used for the analysis, and that concrete impact measurements on variables such as GDP can be provided. The negative side, however, is that the approach depends directly on the estimates of profit losses. The accuracy of the dynamic impact measures is therefore directly related to the accuracy of the estimated profit loss which could skew the estimates. This could be a likely explanation for the very large differences in GDP impact between the Allen Consulting Group study, and that by IDC.

ANNEX I

IIPA 2005 "Special 301" Submission

IIPA 2003-2004 estimated trade losses due to copyright piracy (in millions of USD), and 2003-2004 levels of copyright piracy.

The Americas

	Motion pictures				Records & music				Business software				Entertainment software				Books		Totals	
	Losses		Levels		Losses		Levels		Losses		Levels		Losses		Levels		Losses		Losses	
Priority watch list	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**
Argentina	30	30	45%	45%	42	31	55%	53%	63	44	75%	71%	n/a	n/a	80%	n/a	4	4	139	109
Brazil	120	120	30%	30%	344	339	52%	52%	330	309	63%	61%	120	126	74%	56%	18	14	932	907
Chile	2	2	40%	40%	25	21	50%	40%	41	42	63%	63%	38	n/a	70%	n/a	1	1	107	66
Colombia	40	40	75%	75%	52	49	71%	70%	34	37	50%	53%	n/a	n/a	n/a	n/a	6	5	132	132
Dominican Republic	2	2	20%	20%	10	10	75%	65%	3	3	76%	76%	n/a	n/a	n/a	n/a	1	1	16	16
Watch list																				
Bolivia	2	2	n/a	100%	16	16	90%	90%	7	7	78%	78%	n/a	n/a	n/a	n/a	n/a	n/a	25	25
Ecuador	n/a	n/a	n/a	95%	20	19	95%	95%	7	7	69%	68%	n/a	n/a	n/a	n/a	3	2	30	28
Mexico	140	50	70%	45%	326	360	60%	61%	230	220	65%	63%	132	137	76%	66%	42	40	870	807
Peru	4	4	75%	45%	68	87	98%	98%	18	19	67%	68%	n/a	n/a	n/a	n/a	9	9	99	119
Venezuela	25	25	n/a	50%	31	29	80%	80%	36	33	75%	72%	n/a	n/a	n/a	n/a	n/a	n/a	92	87
Special 306 monitoring																				
Paraguay3	2	2	95%	80%	128	155	99%	99%	6	5	83%	83%	n/a	n/a	n/a	n/a	2	2	138	164
Special mention																				
Bahamas	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Canada	n/a	120	n/a	n/a	n/a	n/a	n/a	n/a	486	500	36%	35%	n/a	n/a	n/a	n/a	n/a	n/a	486	620
TOTAL	**367**	**397**			**1,061**	**1,115**			**1,261**	**1,226**			**291**	**263**			**85**	**78**	**3,064**	**3,079**

Europe

	Motion pictures				Records & music				Business software				Entertainment software				Books		Totals	
	Losses		Levels		Losses		Levels		Losses		Levels		Losses		Levels		Losses		Losses	
Priority foreign country	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**
Russia	275	275	80%	75%	412	405	66%	64%	751	704	87%	87%	256	n/a	73%	80%	42	40	1,736	1,424
Ukraine	45	45	90%	90%	115	125	65%	75%	64	59	91%	91%	n/a	n/a	n/a	85%	n/a	n/a	224	229
Priority watch list																				
Bulgaria	4	4	35%	25%	7	7	75%	80%	16	16	71%	71%	n/a	n/a	50%	n/a	n/a	0	27	27
Watch list																				
Belarus	n/a	n/a	n/a	n/a	26	22	71%	74%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	26	22
Hungary	20	20	35%	30%	12	8	38%	30%	56	55	42%	42%	22	n/a	59%	n/a	4	4	113	87
Italy	160	140	15%	20%	45	42	23%	22%	567	642	47%	49%	n/a	169	34%	47%	23	23	795	1,016
Kazakhstan	n/a	n/a	n/a	n/a	23	23	68%	70%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	23	23
Latvia	n/a	n/a	n/a	85%	12	10	85%	80%	9	10	58%	57%	n/a	n/a	80%	95%	n/a	n/a	21	20
Lithuania	2	n/a	65%	n/a	15	14	80%	85%	11	10	58%	58%	n/a	n/a	85%	90%	n/a	n/a	28	24
Poland	30	30	35%	30%	36	34	37%	45%	175	171	58%	58%	109	n/a	94%	n/a	5	5	355	240
Romania	8	8	55%	35%	18	18	78%	80%	32	28	74%	73%	n/a	n/a	65%	n/a	2	2	60	56
Serbia/Montenegro	n/a	n/a	85%	90%	12	9	80%	75%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	9
Tajikistan	n/a	n/a	n/a	n/a	5	5	81%	82%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	5	5
Turkmenistan	n/a	n/a	n/a	n/a	7	7	85%	89%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	7	7
Uzbekistan	n/a	n/a	n/a	n/a	31	31	81%	81%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	31	31
Special mention																				
Azerbaijan	n/a	n/a	n/a	n/a	12	12	82%	83%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	12	12
Bosnia/Herzegovina	4	4	90%	90%	n/a	3	n/a	99%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4	7
Croatia	2	3	25%	27%	n/a	n/a	n/a	n/a	22	26	55%	59%	n/a	n/a	50%	n/a	n/a	n/a	24	29
Czech Republic	10	n/a	25%	n/a	12	n/a	60%	n/a	58	60	39%	40%	n/a	n/a	n/a	n/a	n/a	n/a	80	60
Estonia	2	2	30%	35%	7	7	60%	60%	9	9	57%	54%	n/a	n/a	60%	60%	n/a	n/a	18	18
Georgia	n/a	n/a	n/a	n/a	8	8	80%	80%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	8	8
Iceland	0	0	12%	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0	0
Macedonia	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Spain	40	30	25%	10%	90	60	24%	25%	283	305	43%	44%	104	n/a	46%	n/a	n/a	n/a	517	395
Switzerland	14	11	20%	15%	n/a	n/a	n/a	n/a	137	174	27%	31%	n/a	n/a	n/a	n/a	n/a	n/a	151	185
TOTAL	**616**	**572**			**903**	**849**			**2,190**	**2,269**			**490**	**n/a**			**76**	**74**	**4,275**	**3,932**

Middle East and Africa

	Motion pictures				Records & music				Business software				Entertainment software				Books		Totals	
	Losses		Levels		Losses		Levels		Losses		Levels		Losses		Levels		Losses		Losses	
Priority foreign country	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**
Pakistan	12	12	n/a	95%	70	70	100%	100%	9	9	83%	83%	n/a	n/a	n/a	n/a	52	44	143	135
Priority watch list																				
Egypt	n/a	n/a	n/a	n/a	8	8	40%	45%	35	34	68%	69%	n/a	n/a	90%	90%	30	25	73	67
India	80	77	60%	60%	67	6	50%	40%	220	187	74%	73%	60	113	86%	84%	38	37	465	420
Kuwait	12	12	95%	95%	8	3	65%	55%	24	24	68%	68%	n/a	n/a	n/a	95%	1	3	45	42
Lebanon	10	10	80%	80%	3	3	70%	70%	15	14	75%	74%	n/a	n/a	75%	80%	3	2	31	29
Watch list																				
Israel	30	30	40%	50%	34	40	40%	63%	36	35	37%	35%	12	n/a	88%	75%	1	1	113	106
Turkey	50	50	45%	45%	15	15	70%	75%	99	81	66%	66%	n/a	n/a	n/a	n/a	23	25	187	171
Saudi Arabia	20	20	40%	40%	15	16	35%	40%	85	76	56%	54%	n/a	64	68%	83%	14	14	134	190
FTA dispute settlement																				
Jordan	2	2	80%	80%	n/a	n/a	n/a	n/a	10	9	67%	65%	n/a	n/a	n/a	n/a	n/a	n/a	12	11
Special mention																				
Cyprus	8	8	50%	50%	n/a	n/a	n/a	n/a	5	5	56%	55%	n/a	n/a	n/a	n/a	n/a	n/a	13	13
Kenya	n/a	n/a	n/a	n/a	13	n/a	98%	n/a	10	8	83%	80%	n/a	n/a	n/a	n/a	n/a	n/a	23	8
Nigeria	n/a	n/a	n/a	n/a	50	n/a	99%	n/a	33	29	85%	84%	n/a	n/a	n/a	n/a	4	n/a	87	29
South Africa	35	35	40%	40%	n/a	n/a	n/a	n/a	91	87	37%	36%	n/a	n/a	n/a	n/a	2	n/a	128	122
TOTAL	**155**	**155**			**75**	**15**			**434**	**393**			**12**	**64**			**26**	**26**	**703**	**652**

Asia Pacific

	Motion pictures				Records & music				Business software				Entertainment software				Books		Totals	
	Losses		Levels		Losses		Levels		Losses		Levels		Losses		Levels		Losses		Losses	
Priority foreign country	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**	**2004**	**2003**
Pakistan	12	12	n/a	95%	70	70	100%	100%	9	9	83%	83%	n/a	n/a	n/a	n/a	52	44	143	135
Priority watch list																				
India	80	77	60%	60%	67	6	50%	40%	220	187	74%	73%	60	113	86%	84%	38	37	465	420
Indonesia	32	29	92%	92%	28	45	80%	87%	112	94	87%	88%	n/a	n/a	n/a	n/a	32	30	204	198
People's republic of China	280	178	95%	95%	203	286	85%	90%	1,465	1,787	90%	92%	510	568	90%	96%	50	40	2,508	2,859
Philippines	33	33	85%	89%	20	22	40%	40%	38	33	70%	72%	n/a	n/a	90%	95%	48	45	139	133
South Korea	40	40	20%	20%	2	4	16%	20%	263	275	46%	48%	349	248	43%	36%	42	38	696	605
Thailand	30	28	60%	60%	25	27	45%	41%	90	84	78%	80%	n/a	n/a	76%	82%	30	28	175	167
Watch list																				
Malaysia	36	38	50%	50%	56	40	52%	45%	74	77	63%	63%	13	n/a	91%	90%	10	9	188	164
New Zealand	10	6	8%	9%	n/a	n/a	n/a	n/a	12	14	22%	23%	n/a	n/a	n/a	n/a	n/a	n/a	22	20
Taiwan	40	42	40%	44%	49	58	36%	42%	83	83	43%	43%	123	262	63%	42%	20	20	315	465
FTA dispute settlement																				
Singapore	10	8	12%	15%	4	3	9%	10%	57	55	44%	43%	n/a	n/a	n/a	n/a	2	2	73	68
Special mention																				
Bangladesh	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	6	n/a	6	0
Burma	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4	n/a	4	0
Cambodia	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4	n/a	4	n/a
Hong Kong	28	28	20%	20%	5	14	19%	30%	56	56	52%	52%	n/a	n/a	n/a	n/a	7	9	96	107
Laos	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3	n/a	3	n/a
Vietnam	10	7	n/a	100%	n/a	n/a	n/a	n/a	27	24	92%	92%	n/a	n/a	n/a	n/a	16	12	53	43
TOTAL	**641**	**526**			**528**	**575**			**2,506**	**2,778**			**1,054**	**1,192**			**364**	**314**	**5,094**	**5,384**

Notes:

Business software estimates are BSA's final 2003 figures. They represent the U.S. software publisher's share of software piracy losses in each country as compiled in October 2004 (based on a BSA/IDC July 2004 worldwide study.

Entertainment software estimates are ESA's reported dollar figures. They reflect the value of pirate product present in the marketplace as distinguished from definitive industry "losses."

Figures are available at http://www.iipa.com/pdf/ (last accessed October 6, 2005)

ANNEX II

The IFPI (International Federation of Phonographic Industries)

The Recording Industry 2005: Commercial Piracy Report

	Music piracy levels in 2004 (percent of domestic pirate units)			
	Less than 10	*Between 10 and 24*	*Between 25 and 50*	*Above 50*
Europe	Austria Denmark France Germany Iceland Ireland Norway Sweden Switzerland United Kingdon	Belgium Finland Netherlands Slovenia Spain	Croatia Cyprus Hungary Italy Poland Portugal Slovakia	Bulgaria Czech Republic Estonia Greece Latvia Lithuania Romania Russia Serbia/Montenegro Turkey Ukraine
Asia	Japan Singapore	Hong Kong (SAR) South Korea Thailand	Phillippines Taiwan	China India Indonesia Malaysia Pakistan
Latin America				Argentina Brazil Central America Chile Columbia Equador Mexicu Parguay Peru Uruguay Venezuela
Middle East			Israel Oman Saudi Arabia	Egypt Kuwait Lebanon
Australiasia	Australia New Zealand			
Africa			Nigeria South Africa Zimbabwe	Morocco

Source: Based on IFPI (2005)

ANNEX III

Model Outline

Products that are infringed all have one thing in common; they are differentiated in some way or another. This follows either from their protected brand name, patented design or technology, copyright, or a combination thereof. Supported by the legal structure, the legitimate manufacturer establishes some degree of market power over his products by restricting market access for products that infringe on a protected IPR.

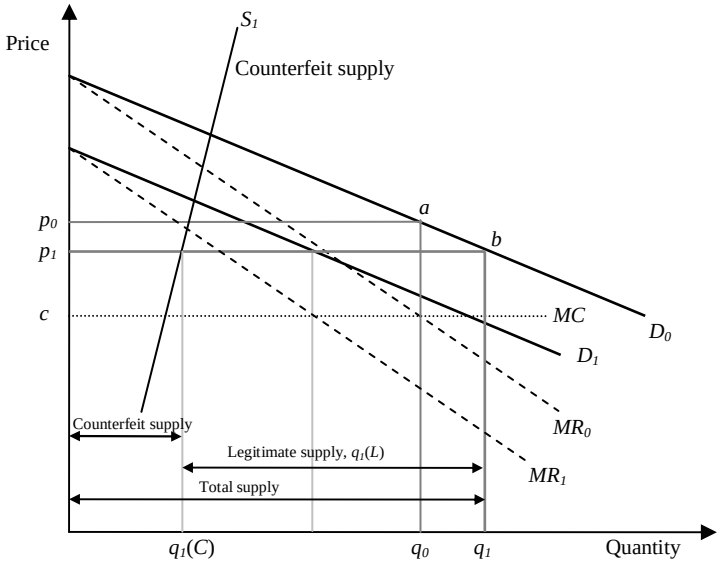
The counterfeiter enjoys a market premium by illegally selling a copy of the genuine product without paying the costs of either product development or promotion. The amount the counterfeiter supplies, however, is bound by the technology required and related cost of production, and is influenced by the risk and cost of detection.

Where the market power of the legitimate producer is great, a dominant-firm pricing model can be used to analyse the effects of counterfeiting. Following this approach, the legitimate producer first sets a price and a quantity to sell, but does so taking competition from infringing products into account. In the modelling framework, the legitimate producer faces a downward sloping demand curve due to market exclusivity. To maximize profits, he sets the market price where the marginal revenues are equal to the marginal costs.[21] There are several ways in which the legitimate producer could take counterfeit competition into account, but it is often assumed that he 'gives up' the market covered by infringing products, for any given price. This means that genuine products and infringements are perfect substitutes, at least by their appearance prior to purchase, and corresponds to a leftward shift of the demand curve the legitimate producer faces (illustrated by the shift from D_0 to D_1 in figure C.2). Hence, the legitimate producer maximises profits over the residual market.

The residual market is characterized by D_1 and the legitimate producer sets the price (p_1) where the marginal revenue (MR_1) is equal to the marginal costs (c). Hence, in a market with no infringements, legitimate sales (q_0) are higher than in a market with infringements ($q_1 - q_1(C)$). From this, both revenue and profit losses stemming from counterfeit goods can be calculated. To obtain estimates of these losses, however, requires information on four factors of the model (see Feinberg & Rousslang, 1990). These are; the demand elasticity of the residual market; the elasticity of counterfeit supply; the market share of counterfeit goods; and the total value of both legitimate and illegitimate sales.

[21] For simplicity, the demand curve is assumed to be linear, and marginal costs are constant.

Figure III.1: Impact of product infringement



The existence of monopoly power in any market is associated with a deadweight loss caused by higher prices than those that would exist in a competitive market. Since competition from infringing products reduces the market for legitimate producers, the actual price of the legitimate product (p_1) is lower than it would have been if no infringement occurred (p_0). This causes a reduction in the deadweight loss of the market which yields an economic benefit to consumers corresponding to the area outlined by p_0, a, b, and p_1. The model therefore also allows a rough estimate of how infringements affect consumers.

ANNEX IV

INTA (1998)

Using pooled panel data for 40 countries over 1992-1995, WEFA estimates the following equation for the apparel and footwear industry separately. Small letters denote logs, *i.e.* $x=\log(X)$, and i and t denote country and time, respectively.

$$s_{it} - n_{it} = \beta_0 + \beta_1 y_{it} + \beta_2 p_{it} + \beta_3 r_i + \beta_4 c_i + \beta_5 y_{it} r_i + \beta_6 p_{it} r_i + \beta_7 c_i r_i + \beta_8 n_{it} r_i + u_i + \varepsilon_{it}$$

The first term, s-n, is the industry sales relative to population, y denotes per capita income, p is the average price of the trademarked goods, r is the degree of trademark protection, and c is the share of total consumer expenditure on apparel and footwear. The rest of the variables are interactions terms, whereas u is a fixed effects term to differences between companies into account and ε is the error term.

Pooled data estimate using 1992-1995 revealed positive but insignificant estimates on β_3, the coefficient on trademark protection. In fact only β_1, β_8 and most company fixed-effect coefficients were significant. WEFA therefore bases the revenue loss estimates on the following simplified model.

$$s_{it} - n_{it} = \beta_0 + \beta_1 y_{it} + \beta_8 n_{it} r_i + u_i + \varepsilon_{it}$$

CEBR (2000)

For each industry CEBR estimates the slope of both the demand and supply equation, and calibrate the model using these estimates to fit the industry data of price and quantity observed over the period 1995-1998. Demand (q^D) and supply (q^S) are assumed given by

$$q_{i,t}^D = \alpha_{0,i} + \alpha_{1,i} p_{i,t} + \alpha_{2,i} P_{i,t} + \alpha_{3,i} y_{i,t} + \varepsilon_{i,t}$$
$$q_{i,t}^S = \beta_{0,i} + \beta_{1,i} p_{i,t} + \beta_{2,i} c_{i,t} + \nu_{i,t}$$

where $q_{i,t}$ is the sales volume, $p_{i,t}$ and $P_{i,t}$ denote the industry retail price index and overall retail price index, respectively, $y_{i,t}$ is the total personal disposable income and $c_{i,t}$ is the industry cost index. Industry subscripts are denoted i = 1,…,4 whereas t denotes time. Interest is put especially on α_1 and β_1 as they represent the slope coefficients on the demand and supply curve, respectively.

PhRMA (2001)

CRA employs a comparative static non-linear model with imperfect, but constant, substitution between legitimate and infringing products. The analytical framework of the model can be outlined as follows.

Assume that demand for both legitimate and imitate products is given by the linear function

$$Q = a - bP$$

Where Q is the composite demand, P is the composite price, and a and b are constants. The production of the composite product is assumed to follow a standard CES (Constant Elasticity of Substitution) production function, which implies that the composite price also follows a CES functional form, here given by

$$P = (p^{1-\sigma} + \tilde{p}^{1-\sigma})^{\frac{1}{1-\sigma}}$$

Where p is the price of the legitimate product, $\tilde{p}$ is the price of the imitator product, and σ is the elasticity of substitution between the legitimate and the imitator product. By Shepard's lemma, the demand for the legitimate product is

$$q = (a - bP)\left(\frac{p}{P}\right)^{-\sigma} \text{ and by symmetry } \tilde{q} = (a - bP)\left(\frac{\tilde{p}}{P}\right)^{-\sigma}$$

Assuming that the legitimate product can be produced at constant marginal costs, c, legitimate producers thus solves the following maximization problem

$$\max_p \pi = (a - bP)\left(\frac{p}{P}\right)^{-\sigma}(p - c)$$

This involves finding the legitimate price equation, p, that solves the first order condition. Given analytical measures for the constant marginal costs, c, and the constants, a and b, the model is calibrated (legitimate price is calculated) based on observed sales revenue data obtained from the IMS HEALTH database, and the elasticity estimates of demand for the composite product, Q, and substitution between legitimate and illegitimate products.

Assuming that $P = 1$ in the initial equilibrium[22], the demand elasticity is then given by $\eta = \frac{\partial Q}{\partial P}\frac{P}{Q} = \frac{-b}{a-b}$.

Hence, from $Q = a - bP$ one gets that $a = R(1-\eta)$ and $b = -\eta R$ where $R = PQ = pq + \tilde{p}\tilde{q}$ is the composite revenue. Similarly, given $P = 1$, from the partial demand functions $\frac{p}{\tilde{p}} = \left(\frac{r}{\tilde{r}}\right)^{\frac{1}{1-\sigma}}$ where $r = pq$ and $\tilde{r} = \tilde{p}\tilde{q}$ denote the revenues from legitimate and illegitimate sales respectively, and the CES price function, p can be calculated such that $p = \left(\frac{\tilde{r}}{r} + 1\right)^{\frac{-1}{1-\sigma}}$. Solving the first order condition of the maximization problem, and substituting for a, b, and p, it can be shown that

[22] This assumption can be seen as a model normalization and has implications as such.

$c = 1 + \frac{1}{\eta v^{\frac{\sigma}{1-\sigma}} - \sigma v^{\frac{1}{1-\sigma}}(1 - v^{\frac{-1}{1-\sigma}})}$ where $v = \frac{\tilde{r} + r}{r}$ which corresponds to the size of the total market relative to the legitimate. From this it can be seen that it is unnecessary to make any assumptions about the conditions under which the price of the infringing product. An estimate of the total market sales, including both legitimate and infringing products, is nevertheless required.

Demand elasticity judgments is based on the United States International Trade Commission (USITC) estimation methods applied in trade dispute analyses, and take into account issues such as general demand insensitivity for pharmaceuticals, higher insensitivity for products related to more chronic, acute and severe conditions. The baseline substitution elasticity is assumed to be moderate, but adjusted according to product attributes as with the demand elasticity. For instance, one would expect higher concern about the product quality if the disease to be treated is more severe. Once the legitimate price is calculated, the loss to legitimate producers can be calculated by omitting the illegitimate market from the model and calculating the hypothetical sales revenue.

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ACRONYMS AND ABBREVIATIONS

AIM	Association des Industries de Marque
AIPM	Association of International Pharmaceutical Manufacturers
ASEAN	Association of South-East Asian Nations
BSA	Business Software Alliance
CEBR	Centre for Economic and Business Research
CIPR	Coalition for Intellectual Property Rights
CRA	Charles River Associates Inc.
ESA	Entertainment Software Association
EU	European Union
EC	European Community
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
IACC	International Anti-Counterfeiting Coalition
IBOPE	Instituto Brasileiro de Opinião Pública e Estatística (The Brazilian Institute of Public Opinion and Statistics)
IDC	International Data Group (a global provider of market intelligence)
IFPI	International Federation of the Phonographic Industry
IIPI	International Intellectual Property Institute
IMS	(before Instructional Management Systems), now IMS Global Learning Consortium
INTA	International Trademark Association
IPTOC	Intellectual Property Theft and Organized Crime
MPA	Motion Picture Association
MPAA	Motion Picture Association of America
NAFTA	North American Free Trade Agreement
NTSB	National Transportation Safety Board
OECD	Organisation for Economic Co-operation and Development
PhRMA	Pharmaceutical Research and Manufacturers of America
SFIIP	Swiss Federal Institute of Intellectual Property
US	United States
USITC	United States International Trade Commission
WCO	World Custom Organization
WEFA	(now Global Insight) made up from DRI and WEFA
WHO	World Health Organization