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Pricing Digital Information Goods and Services on the Net

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Abstract-Many analysts argue that the Internet is producing a fundamental change in the way that business works. The network economy grows faster every day. Internet markets are developing rapidly with information being the single most traded commodity on the Internet. This paper looks at the extent to which conventional pricing theory applies to this type of good and whether it requires modifications in order to be applicable to cyberspace. Do issues such as the ease of consumer arbitrage activity, privacy or convergence constitute a major impediment to the application of conventional price theory? The thesis considers these issues with particular reference to the implications for consumer welfare on the one hand and economic efficiency on the other.

The findings of the research with respect to the economic theory's applicability to the digital information goods and services traded on the Internet is mitigated. The diverse pricing schemes will be applicable according to different industries trading electronically. For the establishments of price discriminatory schedules to be efficient and welfare enhancing, three conditions must be reunited: side issues such as consumer arbitrage, unbundling ought to be resolved and the seller ought to be aware of consumer price sensitiveness and market output must increase.

Key Words: Digital Information goods and services, Electronic Commerce, Consumer Arbitrage, Price Discrimination, Welfare and Efficiency

I. INTRODUCTION

The network economy grows faster every day. Potential markets on the Internet are developing at a rapid pace. Information is the single most traded commodity on the Net. Recent literature on the economics of the Internet has attempted to apply tools of long-established economic theory to the goods and services bought and sold throughout the network. These goods and services are referred to as digital information product and services, which represent what the content of the Internet, essentially the World Wide Web, provides on a commercial basis. In applying economic theory, especially pricing theory, to the Internet, the fundamental question that arises for economists is whether the Internet, and more specifically commerce on the Net, is so different from conventional markets that conventional economic theory either does not apply or needs modification to be applied successfully?

This Paper investigates briefly the cost structure of digital information products, followed by the extent to which traditional pricing theory applies to digital information. It revises briefly the theory of pricing, in particular the theory

of price discrimination, as it is applied to information goods and services. Product differentiation and bundling theories are both considered along with the mainstream pricing theory, with respect to their potential application to digital products. It is argued that issues arising from the implementation of pricing policies to digital information goods and services potentially jeopardise the efficiency of these pricing strategies. Finally, having assessed the theory and application of cost and pricing structures of information, the implications of applying such pricing structures are considered in terms of welfare enhancement and efficiency gains. The pricing strategies associated with infrastructure and connection to the network are not considered. It is assumed that consumers and firms have access to the Internet at a constant fee.

II. COST STRUCTURE OF DIGITAL INFORMATION

Information goods have high fixed costs of production and low variable costs of reproduction.¹ The fixed cost can be considered as "sunk" or non-recoverable cost once it is invested in the production process. Contrary to a common view, however, the marginal cost is not zero. Variable costs must incorporate the copyrights cost involved with the sale of each commodity.² In addition to these copyright costs, network costs should also be embodied in the variable costs scheme.

Note that Whinston (1997) incorporates a congestion component in the variable costs curves.³ Congestion depends on the distribution of quantity demanded over time and its effects should be included in a dynamic model. Congestion will occur if demand for a digital product/service is highly concentrated at a point in time and exceeds the capacity of dissemination of the network provider.

Moreover, for long run marginal cost or fully distributed cost some fraction of total fixed cost needs to be accounted for. Mathematically, the total costs (TC) to produce the i^{th} unit for person j are represented as follows:⁴

¹ Shapiro, Carl and Varian, Hal R., Information Rules: A Strategic Guide to the Network Economy, Harvard Business School Press, Boston, Massachusetts, 1999, pp. 20-22

² Leer, Anne C., It's a Wired World: The New Network Economy, Scandinavian University Press, Oslo, Norway, 1996, pp.112-120

³Whinston A. B., The Economics of Electronic Commerce, by Choi Soon-Yong, Stahl D. O. and Whinston A. B., Macmillan Technical Publishing, Indianapolis, Indiana, 1997, p.349

⁴ Inspired from Nicholson, Walter, Microeconomic Theory: Basic Principles and Extensions, Sixth Edition, The Dryden Press, Orlando, FL, 1995, p. 690, footnote 15.

$$TC_{i,j} = S + cq_{i,j}$$

Here c is the marginal cost of production, $q_{i,j}$ is the i^{th} output for person j and S is the fraction of the sunk costs recovered by person j buying the i^{th} good. As the share of acquiring the good increases, a greater amount of the sunk costs are recovered so that the sale of the commodity is profitable. In part, it is this mix of high production and low reproduction costs that causes difficulty for pricing and cost recovery. In economic theory, price discrimination is a common solution to this problem.

III. THEORY OF PRICE DISCRIMINATION

The theory of price discrimination is generally discussed within a monopoly framework. Although the theory of price discrimination is directly relevant to this paper, monopoly-pricing schemes are not discussed here. The theory of price discrimination involves selling different units of an identical product at different prices to the same or different consumers. This allows the producer to discriminate with respect to an exogenous (such as age or gender) or an endogenous (such as time, amount and type of purchase) classification. It directs the consumer towards self-selection, as the consumer chooses the category he fits in best. Self-selection may be precarious for fraudulent moves and lead to arbitrage problems.

Even though this drawback exists, price discrimination seems to be adopted, as it enhances profits, and potentially enhances welfare and efficiency in pricing. The pricing scheme is attractive for firms to increase profit, but is it necessarily improving the efficiency and economic welfare as intended? The effects of price discrimination on efficiency were first analysed by Ramsey (1927).⁵ Ramsey looked at the magnitude of efficiency gains through his own style of pricing (Ramsey Pricing). Efficiency and welfare effects are reviewed and analysed with respect to digital information goods in the last section of this paper, and Brown and Sibley (1986) extensively debate the same issue.⁶

Dupuit (1962) analysed the effect of discrimination upon prices, output and welfare.⁷ He distinguished and examined several types of discriminatory strategies, now called “degrees” of discrimination after the taxonomy of Pigou (1920).⁸ Pigou distinguishes three degrees of price discrimination, which are briefly defined here.

A. First-Degree

The first-degree price discrimination is also termed perfect price discrimination. In this case, consumers have unit demand and the producer knows exactly consumer’s marginal willingness to pay as well as being able to avoid the arbitrage problem. The Producer will charge individualised prices set to equal consumer’s marginal willingness to pay, or “reservation price”. The “reservation price” is the highest price the buyer is willing to pay for one unit of the commodity. Perfect price discrimination is rarely observable in the real world.

B. Second-degree

The second-degree price discrimination is also known as non-linear pricing. Through this process of discrimination, the price per unit of output is dependent on the quantity purchased by the consumer. The system of pricing implies quantity discounts and quantity premium.

C. Third-degree

In third-degree discrimination, the producer is able to identify each customer belonging to different consumer groups, separated from one another by more or less distinguishable characteristics, and can charge different prices to the members of the different groups.⁹

More importantly, “[e]ssentially what is required is knowledge of group-specific demand functions.”¹⁰ It is essential to know the elasticity of the demand with respect to price ($\epsilon_{p,d}$) to price discriminate at any of the three degrees along with the ability to separate market according to the different types of demand (discriminated by the firms exogenous or endogenously). Mathematically:¹¹

$$\text{Max}_{x_i} p_i(x_i) x_i - c x_i$$

The first order condition for this particular problem is:

$$p_i(x_i) + p_i'(x_i) x_i = c$$

⁵ Ramsey, F. P., “A Contribution to the Theory of Taxation”, *Economic Journal*, Vol. 37, 1927, pp. 47-61, *passim*.

⁶ Brown, Stephen J. and Sibley, David S., *The Theory of Public Utility Pricing*, Cambridge University Press, Cambridge, 1986, Chp.3 & 7

⁷ Dupuit’s analysis is reviewed extensively in Ekelund, Robert B., “Price Discrimination and Product Differentiation in Economic Theory: An Early Analysis”, *Quarterly Journal Of Economics*, Vol. 84, 1970, pp.268-278

⁸ Pigou, A. C., *Economics of Welfare*, Macmillan and Co., London, 1920, 4th edition, 1962, p.277.

⁹ Philips, Louis, *The Economics of Price Discrimination*, Cambridge University Press, Cambridge, UK, 1983, pp.12-13

¹⁰ Spence A. Michael, “Multi-Product Quantity-Dependent Prices and Profitability Constraints”, *Review of Economic Studies*, XLVII, 1980, pp.830-831

¹¹ Varian, Hal R., *Microeconomics Analysis*, Third Edition, W. W. Norton & Company, New York, 1992, pp.247-248

The Elasticity of demand in market i (ϵ_i) allows one to rewrite the latter expression in this manner:

$$p_i(x_i) \left[1 - \frac{1}{|\epsilon_i|} \right] = c$$

This latter equation illustrates the relative importance of the elasticity of demand as an important measure for consumer's price sensitiveness.

IV. IS THE THEORY APPLICABLE TO THE INTERNET?

The major departure from accepted pricing theory is to price at marginal willingness to pay. The theory of price discrimination analyses the pricing strategies at marginal cost, whereas information is priced at the consumer's marginal valuation. The style or degree in pricing that ought to be adopted for digital information goods and services depends on the characteristics of the goods themselves rather than the universal application of a particular price discrimination scheme. Two pricing strategies apply to most goods and services traded on the net: versioning incorporating third degree price discrimination augmented by product differentiation, and perfect price discrimination, or personalised pricing.¹²

A. Versioning

"[...] the 'product' policy of a firm involving a different adjustment of its 'product' in each market, and the policy of price discrimination go hand in hand, and the former is frequently a prerequisite of the latter."¹³

In many respects product differentiation or versioning appears as an extension of the third-degree price discrimination. In the case of digital products and services, versioning may actually be the basis for price discrimination, contrary to the mainstream economic theory where price discrimination is the basis for product differentiation. By differentiating the product, the producer can divide the market into two different demand types and can recover

revenue from the low-demand section of the market without jeopardising the high-demand component.¹⁴

A recent paper by Denackere and McAfee (1996) proposed to differentiate products by voluntary degradation or "damaging" of the good to suit the lower ends of the market whilst providing the complete version of the commodity to the high-end.¹⁵ Offering different versions of the same product or service may surmount, by induction, the self-selection problem implied by third-degree price discrimination. Versioning appears to be the most popular approach to price discrimination on the Internet.

Product differentiation, but also price discrimination, seems to be applied strictly with respect to digital products within the network. Authors, such as Whiston (1997) and Shapiro and Varian (1999) give little consideration to the potential pricing relationship between digital products and their physical equivalent.¹⁶ Often the digital products are either substitutes for on-line "damaged" versions of their physical counterparts or complements to the physical equivalent. In the latter case if the digital good actually complements the physical commodity, the manufacturer will find it advantageous to promote it. In the former case it will be in the manufacturer's interest to charge the on-line product, recovering cost either through advertising or fees.¹⁷ Moreover the digital product may be packaged as a different version to avoid direct competition with the off-line good. Consider the following example of *The Economist*, which illustrates versioning on the Internet.

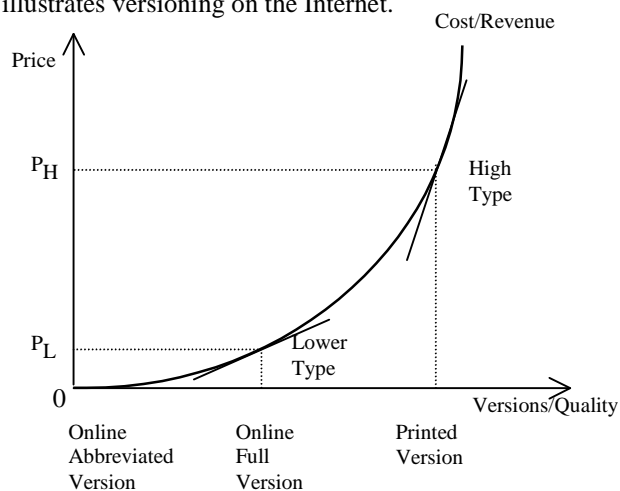


Fig. 1. Versions of the Economist

¹² Some of these pricing schemes are extensively debated in Bailey, J. and Brynjolfsson, Smith, M., "Understanding Digital Markets: *Review and Assessment*", unpublished, July 1999, available at <http://ecommerce.mit.edu/papers/ud>

¹³ Moroni, Yves R., "Discrimination Under Market Interdependence", *Quarterly Journal of Economics*, Vol. LXI, November 1947, p.105

¹⁴ Varian Hal R., "Pricing Information Goods", <http://www.sims.berkeley.edu/~hal/papers.html>, Ann Arbor, June 1995. Paper presented at the Research Libraries Group Symposium on "Scholarship in the New Information Environment", at Harvard Law School, May 2-3, 1995.

¹⁵ Deneckere, Raymond J. and McAfee, R. Preston, "Damaged Goods", *Journal of Economics & Management Strategy*, Vol. 5, No. 2, Summer 1996, pp.149-174.

¹⁶ Whinston, A. B., *Opus Cit.*, 1997, *passim*; and Shapiro, Carl and Varian, Hal R., *Opus Cit.*, 1999, *passim*

¹⁷ Shapiro, Carl and Varian, Hal R., *Opus Cit.*, 1999, pp. 66-67

In the above, it is assumed that the cost of access to the Internet is not counted into the price of the two online versions. The graph shows the different levels of differentiation.¹⁸ The printed version will suit the customer with a higher marginal willingness to pay. The lower-end of the market, with a lower reservation price, can benefit from either a full payable on-line version or an abbreviated free-of-charge version. This particular case highlights the possibilities of differentiation: on-line version being a substitute for an off-line product and versioning of the on-line product. This example also illustrates the ability to segment the market according to consumer's incremental price. Free download, free access and other give away samples are often the result of marketing strategies whereby firms try to attract the consumer to buy the full version of the product or service. In this particular case, versioning (or more precisely intentional degradation of the commodity) aims at product promotion more than an effort to supply the lower end of the market on top of the high-end.

B. Personalised Pricing

The structure and properties of the Internet makes personalised pricing possible, especially in the case of information services and brokerages. Some authors, for example Whinston (1997), seem to suggest that the electronic economy provides the perfect background to discriminate price at the first degree, as it is relatively easy to collect consumer information over the network.¹⁹ In fact, in order to apply first degree price discrimination, the manufacturer will require detailed consumer information, since prices are individualised. Practically, information is obtained either through registration and billing or through observation from search queries. Web sites collect a maximum of information about consumers visiting and purchasing on their sites. For example, if one searches for a piece of literature on Amazon.com, the site will often recommend books other clients have purchased from the same category.²⁰ Personalising involves bundling of desired attributes according to one's preference.

Whether such discriminatory procedure is feasible or not for digital information products and services is highly dependent on the properties of the good themselves. There are, however, important issues surrounding discrimination that are discussed further below. Furthermore some goods and services are adapted to the application of such discriminatory schedules. Information agents and search brokers services are an example of a case where customisation is favourable. In fact, the Internet enables the consumer to find precise information about a particular area of interest, with the help of the information filtering and

gathering services. In other words, the Internet proposes the depth rather than the breadth of information; the bundling of desired information would really only be efficient if it responds to the consumer's demand criteria. Both goods and services can be customised.

C. Issues

The general argument in the literature states that simple price discrimination theory applies to the Net. The digital nature of online product and the difficulty of both defining and imposing a clear online jurisdiction, however, means there are issues that require resolution in order for the basic theory of pricing in economics to be applicable on the Net.

1) *Consumer arbitrage*: The central issue is consumer arbitrage. This is a major issue on the Internet that has yet to be fully resolved. Consumer arbitrage can be briefly defined as illegal reproduction and distribution of a product licensed by firms, violating copyright. The restriction of consumer arbitrage is required for successful price discrimination. It is related to the basic technical properties of information, namely transmutability and reproducibility. Illegal copies may crowd out legitimate sales and producers may not be able to recover their costs of production. The challenge for the Internet is to ensure the proper implementation of copyright and reduce consumer arbitrage. In other words, to make copyright work in the electronic sphere.²¹

2) *Reversing Process – Unbundling*: Consumer arbitrage issue is in part connected to the ease of unbundling. Transmutability makes it such that on the Internet it is easy to reverse the process of both bundling and “damaging” (versioning) goods, to re-bundle at will and recover the full version. Both consumer arbitrage and the reversing process imply self-selection problems so that consumers with a higher marginal willingness to pay acquire either the full version from another “non-official” source or acquire the lower-end version and then recover the full version. Both cases represent a loss of revenue for the seller, an inefficient outcome in terms of price discrimination and a decrease in welfare (as producer surplus is not maximised).

3) *Elasticity of demand*: Another issue that impedes efficient application of the pricing schemes is the lack of knowledge of the elasticity of demand for the diverse digital information goods and services. Without this knowledge, it is difficult for the seller to segment the market at the different incremental values and to create appropriate versions of goods. The Internet enables the seller to collect numerous amounts of data on consumer preferences, for example, when businesses require registered billing and subscription. This, however, does not imply that the producer is supplied with

¹⁸ Inspired from Whinston, A. B., *Opus Cit.*, 1997, p.356

¹⁹ Whinston, A. B., *Opus Cit.*, 1997, pp.323-330

²⁰ <http://www.amazon.com>

²¹ Leer, Anne C., *Opus Cit.*, 1996, Chp.3, passim

the relative price sensitivity – the elasticity of demand - of each buyer.

4) *Privacy*: Another issue that arises from price discrimination at the first degree is the loss of consumer's bargaining power and the related issue of privacy. By revealing his own preference to the producer, the consumer loses his bargaining potential to the producer, who can extract the entire consumer surplus. This loss of bargaining power is not very appealing from a consumer's point of view.²² This partly explains the recent debates over privacy issues on the Internet, and the intentions of governments to ensure that privacy rights are respected on the Internet:

“US internet regulation ‘is inevitable’: [...] the bipartisan Online Privacy Protection Act of 1999 was introduced into the US Senate, [...]”²³

In some cases though, it is in the consumer's interest to provide the producer of digital information goods or services with personal information, in order to optimise the satisfaction yielded by the good or the services provided. If the consumer could supervise the process of personal information provision, privacy issues would be lessened.

V. WELFARE & EFFICIENCY

Pricing and the Internet

Although some argue to the contrary, economists would take the view that resources on the Internet are finite. In this case, the presence of price discrimination and product differentiation seems to be a good scheme to improve welfare and improve the efficiency of the allocation resources. If on the other hand, technology keeps expanding as it has for the last ten years and the Internet technically does not exhibit excess capacity (relative to the number of users), then these pricing techniques are going to be primarily about increasing firm's profit. They will have a role in maintaining a high level of quality and commitment to consumers in the provision of services and products throughout the connected network, but most importantly in ensuring full cost recovery. As has been argued previously there are transaction and reproduction costs involved with the net and these need to be covered with economic returns.

One, then, can ask the question: does the producer intentionally create different versions of products to recover costs and enhance profit providing both ends of the market? The product differentiation theory is applicable for goods and services traded on the Internet. Such versions of some goods are available from electronic commerce sources in the form

of a “free downloadable”. In this case, they can be considered as promotional tools for the actual product for sale. In other words, the simplified versions of e-commodities aim at providing “experience” rather than trying to satisfy the diverse section of the market and thereby recovering cost non-linearly. This is corroborated by the fact that most of these lower end goods and services are often free and not for a minimal fee. It is, however, possible that at the present stage of development of the Internet the lower end incremental value is close to zero. Hence, making these versions free is consistent with pricing theory. Furthermore, even in this case when the firm does not attempt to recover costs and enhance profit through the free give-away samples, the existence of the low end versions improves welfare by providing both types of demand (low versus high demand) with the product in a form consistent with what they are willing to pay.

A more crucial question is whether price differentiation or more precisely, versioning enhances welfare in the case of digital information goods and services? Theoretically, welfare will improve if and only if the output increases as a result of the creation of versions of the product and the associated price discriminating.²⁴ Is this the case for digital information goods and services? The simple answer to this question would be yes, given the analysis on price discrimination and its application to e-commerce. This conclusion is consistent with that of Shapiro and Varian (1999).²⁵ However, while a conventional reading of the theory leads to this conclusion there are important caveats that need to be stressed and which emerge from this research. These caveats relate to the impact and operation of versioning and third degree price discrimination in the particular context of digital information goods and services.

Is Pricing Efficient?

The first crucial issue is that successful price discrimination requires a detailed knowledge of the elasticity of demand with respect to price. This is necessary for the resultant prices to promote efficiency and increase welfare. It is an important piece of information for the online seller to acquire. Information on consumers price sensitivity or more directly on the marginal willingness to pay enables the producer to match each version of a good or a service with the appropriate characteristics to the consumer at the appropriate price. In the case of most digital information goods and services, such knowledge is unavailable, which a priori means that price and product differentiation is inefficient. Data on consumer price elasticity or incremental valuation for offline products could be used as a proxy to the

²² To see how sites collect information about consumers and the current potential privacy issues, please consult: <http://www.anonimizer.com>

²³ Quittner, Jeremy, “US internet regulation ‘is inevitable’”, *The Australian Financial Review*, 4th of May 1999, p.41

²⁴ Hausman Jerry A. and MacKie-Mason Jeffrey K., “Price Discrimination and Patent Policy”, *The RAND Journal Of Economics*, Vol. 19, No. 2, Summer 1988, p. 255

²⁵ Shapiro, Carl and Varian, Hal R., *Opus Cit.*, 1999, pp. 20-22

elasticity of demand or marginal willingness to pay for online goods, depending on the different types of industries.

Information, however, on consumers will increase. As electronic commerce for some industry grows, data is accumulated, as online traders require registered billing. This is the case for example with Amazon.com, which requires the consumer to register and proposes to create a personal account. As a result of this strategy, the supplier of books is able to gain information about the consumer and matching their preferences very closely to similar consumers who purchased other books in the same category. This, however, is not a perfect substitute for knowledge of the elasticity of demand for specific digital goods and services, which as noted above, is necessary for prices and product differentiation to be optimal.

Other issues are important for welfare and efficiency improvements to occur. The previously discussed availability of reversing or recovering process (such as unbundling) is a serious problem. Two important issues arise: consumer arbitrage and self-selection. The reversing process implies that the full versions intended for the high end of the market could be recovered from the “damaged” version without the online seller’s approval and without paying for the right to do this. In this situation, the seller would lose some surplus and be technically less efficient. Efficiency loss may also occur due to the self-selection problem. Self-selection issue arises, as it becomes more advantageous for some consumers to purchase the lower end product and use recovery techniques to re-create the full version. Different versions of the same software may be an example, where a consumer buys the simplest version and searches the Internet for the upgrading parts unbundled from the full version. Another example, somewhat different in appearance but intrinsically the same, is the case of shared membership of a fee-based site.

Furthermore, unbundling or the reversing process creates consumer arbitrage problem. It should be noted that consumer arbitrage is an issue not solely associated with the recovering process. The presence of these illicit copies potentially crowds out legitimate sales and the producers may therefore not be able to recover their costs of production. This is a major threat to firms trading electronically, which is becoming more and more important as electronic commerce grows and the Internet expands. Arbitrage and the reversing process problem potentially creates high policing costs in order to avoid the propagation of these illicit copies.

It will be necessary to resolve these issues in an efficient way, so that the application of the price discriminatory schemes comes close to full efficiency and maximum welfare enhancement, ensuring a total output increase. These issues, however, do not necessarily need to be solved for the pricing to take place, but the potential benefits from solving these issues, in efficiency and welfare terms, are lowered. Furthermore, the output increase from third degree price discrimination and versioning cannot be guaranteed. Such

total output increase is a necessary condition for welfare to improve.

First Degree

First-degree price discrimination is, by definition, perfect. Customising enables the producer to satisfy the consumer fully and at the same time, the producer surplus, is maximised. Consumer surplus, on the other hand, is equal to zero. In other words, first degree price discrimination may be considered as socially efficient. First degree price discriminating would lead to a Pareto optimal situation, where consumer surplus would be completely extracted and producer surplus maximised. This pricing scheme is applicable in the case of goods and services sold on the Internet, but only for some particular industries. Moreover, the online industries best fitted for this pricing strategy are the digital information database services, which can calibrate their supply according to a consumer’s preferences. The number of industries, for which such scheme is possible, is limited. Furthermore, as with versioning, issues such as unbundling leading to consumer arbitrage problems, which must be solved until full efficiency and welfare enhancement can be achieved.

VI. CONCLUSION

In conclusion, the main issue for this paper has been whether long established microeconomic theories can be easily translated to the online world. Is the Internet by nature so different that long established theories must be changed? The answer is a qualified “no”. The Internet can be considered a reflection of the off-line world, which partly explains why a lot of goods and services are identical in the off-line and on-line world. It can also explain the attitude of economists, such as Shapiro, Varian and Whinston, who attempt to draw straight parallels and apply well-established economic theory directly to the network economy. The issue, however, is not as clear-cut as implied. The very nature of the digital information goods and services traded on the Internet makes consumer arbitrage relatively easy and facilitates unbundling or reversing processes. In addition, there is an apparent lack of knowledge of consumer’s price sensitiveness across market segments. Therefore, while the theory is essentially applicable, achieving the potential efficiency and welfare gains that correct pricing could produce requires some fundamental issues to be resolved.

The following table summarises some of the key issues that have been identified and their implications.

TABLE 1
SUMMARY OF ISSUES

Issue	Condition Arising	Findings
Arbitraging across segments	Illegal copies produced in the market place.	Copyrights are less effective with arbitrage.
Reversing/unbundling	Reverse/unbundle low-end version to recover high-end version	Loss of both revenue & share of market
Unknown price elasticities	Reduces opportunities for price discrimination.	Uniform pricing likely to reduce efficiency and welfare
Privacy	Revelation of consumer information, including preferences and price sensitivity.	Reduces on-line market opportunities and effectiveness of price discrimination. Effect reduced if Consumers have control over the process of information provision.

Further Research:

Unlike the off-line markets, empirical analysis of Internet markets is virtually non existent. There is a need to increase understanding of Internet pricing issues through further empirical studies designed to test the applicability of price discrimination theory to online goods. These should include:

- Surveys of top online-trading firms to document their pricing policies and determine whether their online output is increasing as a result of price discrimination being applied.
- Comparing online and offline versions of products and services to determine the extent to which the pricing policies are different in the on-line world and the extent to which the on-line world is treated as another market segment in the overall pricing structure.

There is a need to consider the role of governments in tackling some to these issues. Most important, the pricing policies apply globally and there is a need to consider how limited jurisdictions can deal with some of these issues, most notably unbundling, revering and arbitrage processes that operate across jurisdictions.

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