
Information O Scarcity

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Computing and network technologies mean that some products can be considered as *information products* and can be distributed to large numbers of people for not much more than it would cost to supply them to small numbers of people. This does not happen: The need for sellers to make money causes a *scarcity of information products*, which is shown to be artificial. Distribution of information products by the market is inefficient. A method of dealing with this scarcity problem is described that does not rely on state interference and which abstracts agreements involving buyers and sellers. The economics behind such an idea are already understood. What is proposed here is a business model that can make them work on a large scale, without any centralized system of assigning value to products.

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List of Abbreviations

CD	compact disc
DRM	digital rights management
DVD	digital versatile disc
IP	intellectual property

1 Introduction

A huge amount of information is produced by our society and enters the market as *information products*. By “information product” I mean a product the buyer of which is mainly paying for information. Examples of information products are downloaded music, movies, books and computer software. A key feature of an information product is that, in principle, supplying it to many people would not cost the supplier much more than it would cost to supply it to one person. This is because the main cost is in the production of the first copy of the information product, and after that more copies can be produced from that first copy much more cheaply. There may always be some cost in producing copies of information products, associated with such things as the need to use bandwidth in downloading, accounting and payment processing to deal with a sale, etc., but as technology advances it should be possible to get closer to what I will call a *pure information product* – an idealized one in which all of the cost is incurred in initial production of the first copy and no cost at all is incurred in production or supply of any number of subsequent copies. For most of this article I will be assuming that we are dealing with pure information products.

The Internet means that we are already close to having pure information products. It should be economically feasible for us all to own practically unlimited amounts of information products as, in principle, it would not cost sellers much more to supply many information products than it would to supply few of them, and they could charge the same amount of money in total, or maybe even a bit more, so that they would be no worse off. We should be living in an *information-rich society*.

This is prevented from happening by the need of sellers to make money. They need to charge money for information products to make money, and charging for something naturally creates scarcity: There is a limit to how many information products each of us can afford. Scarcity like this may be appropriate for “physical” things like cars or houses, but when it is introduced for something which can be copied an unlimited number of times it means that the market, no matter how efficient in the usual economic sense, is inefficient at distributing information.¹ This is bad for society, because with advancing technology, an increasing proportion of wealth creation is going to be information creation, so information scarcity will limit our wealth in general.

This article will propose a way of dealing with information scarcity. It will in no way be an argument against the free market. I will not be making any proposal for state control of information supply nor making any appeals to better human nature. Instead I will be proposing an approach that works within a free market economy and involves

¹ I am using the word “physical” informally here, to distinguish certain products from things like downloaded computer software, etc. Actually, even downloaded products are physical in that they involve some configuration of matter. This article, however, will not be debating what “physical” means.

abstractions of agreements involving buyers and sellers. I will show how, with the appropriate facilities, such as a website to implement this method, without sellers having to alter their motivation of making money in any way, information scarcity could be greatly reduced, bringing about an information-rich society.

The basic economics principles being considered here have been discussed previously by economists. For example, there is a 1999 article by Bakos, and Brynjolfsson.² The basic idea that will be used in that of selling things in *packages*. My real intention here is to present a business model show how these economic principles could be applied on a large scale, without any kind of central control over pricing or any central authority making value judgments about individual products. I will be describing something that could be built – and that could have a considerable effect on the market for information products. I will not be assuming that anyone has prior knowledge of any of the economics, and the article will develop the whole thing from basic principles.

² Bakos, Y., Brynjolfsson, E. (1999). Bundling Information Goods: Pricing, Profits and Efficiency. *Management Science* 45 No. 12 pp1613-1630. (Also available online at <http://pages.stern.nyu.edu/~bakos/big.pdf>.)

2 Copyright and Scarcity

A lot of information is sold as copyrighted information: The copyright holder controls distribution and copying. The idea is that the copyright holder can charge people for copies of the information and get rewarded for his/her work.

Some people think that this is the preferred situation because, in a capitalist economy, the market will tend to set the correct price for information. For example, a piece of music that is overpriced will not be bought by many people, so the creators of music (or more realistically, the distributors) will tend to price music more reasonably.

A problem with this is that it imposes scarcity where there need be none. Scarcity has been needed in the past because it reflected the natural situation. Each instance of a product would need considerable resources, including human work, to make it, and more products would need more resources. For example, making 1,000 cars would cost much more than making one car because it would need more metal, more plastic, more human work involved in assembly, etc. The high cost of a car imposes a scarcity of cars on the marketplace: It limits the number of cars owned by people according to how much money is available to buy them all. This scarcity reflects the natural scarcity that cars have: A given amount of money can only pay for production of a given number of cars.

The scarcity imposed by doing this with information products is more artificial because, while a lot of resources may be put into creating the first copy of an information product, once you have started distributing copies of it, distributing more copies of it may not cost proportionately more. For example, a considerable amount of resources may be put into writing a computer program, a piece of music or a novel, but once it has been made, those resources have already been spent and they are the same whether 100 copies or a million copies are made. Someone could object by pointing out that you still need to pay for the printing of each novel, or for physically making each compact disc (CD) or digital versatile disc (DVD), etc. and that if you need a million copies of a paperback novel, for example, you need to print it a million times. There are two answers to this:

- When the customer is mainly paying for information, even though things like books or DVDs may need to be produced, items like this, made to distribute information, tend to be much less expensive than things like cars. When the customer is mainly buying information, a greater proportion of the resources have already been invested to produce that information, and a smaller proportion of the resources are needed to produce each copy.
- Digital distribution, in which the customer does not take delivery of some item of hardware containing the information, such as a CD or book, but instead downloads the information, can significantly reduce the costs of providing each copy, possibly making them almost negligible.

We should start to consider information in the future in terms of the first copy costing a lot of money and subsequent copies costing much less money. This means that any scarcity that the economy imposes on selling of information will be artificial.

What has been discussed here has been stated in terms of copyright, but it also applies to other forms of intellectual property (IP).

3 Is the scarcity *really* artificial?

Some people will say that I am wrong to think of the scarcity of information products as artificial and support this by reciting classical capitalism. They will say that the market sets prices according to demand and there is nothing stopping everyone having a copy of an information product if they are all prepared to pay for it. The market is doing what it is supposed to and setting prices appropriately. The market could also be viewed as correctly setting the level of scarcity according to demand.

The problem with this is that I am not arguing against capitalism. This is nothing to do with whether or not the market sets prices efficiently, and if anyone argues that the market also sets scarcity appropriately I would point out that *the ideal, for information products, is always zero scarcity.*³

The ideal, for us as individuals and as a society, is for us all to have access to unlimited amounts of information. I am not going to claim that that can be achieved, incidentally: It is just an ideal. Some information products could benefit society, and could benefit it more if widely available.

³ Throughout this article I will be ignoring information that we may *not* want to be available to everyone, such as instructions for manufacturing chemical weapons at home, etc. I will also be ignoring the fact that some information products may be degraded by distribution to a large number of people. This would be the case, for example, with a computer program that could predict stock market behavior, as the possession of such a program by many people would change the very behavior that it was supposed to predict. A book about how to do better than other candidates in job interviews would have a similar issue: It is impossible for *everyone* to succeed in the same job interview for one job.

4 Scarcity Reduction Scenarios

To show that scarcity of information products is artificial, the following are some scenarios. The point of them is not to suggest credible methods for reducing information scarcity, but to show that there are ideal situations in which it is removed.

4.1 The Universal Ownership Scenario

Suppose each person alive now spent what he/she was otherwise going to spend anyway in his/her lifetime, but in return was able to own every publicly available information product in existence: Everyone owns a copy of every novel, piece of music, or computer program – or more likely, has the right to download it. The same amount of money is going into the marketplace, but everyone has more. The problems with this are that we do not know what people would have spent and on what they would have spent it. We might imagine this working in a number of ways, but I will leave this scenario vague rather than saying how we do these things. The point is that the scarcity is removed in this scenario, suggesting that it is artificial.

4.2 The Mind-Reading Scenario

This scenario is really a more detailed version of the last one, with some attempt to describe how things work.

Suppose there were a mind-reading machine that could detect if you are willing to pay for a given information product. If you want to own an information product you go to an information product shop. Here, the mind-reading machine is used to scan your brain and then displays either “Free” or “Pay”. If the mind-reading machine indicates “Free” then you are allowed to have a copy of the information product without paying, but if it says “Pay”, and you still want the information product, you are required to pay for it. You do not have to buy it: You can just walk out of the store if you wish.

The mind-reading machine makes its decision about whether to indicate “Free” or “Pay” by examining your brain and determining whether you are expected to choose to buy the item if it indicates “Pay”. If the mind-reading machine predicts that if it indicates “Pay” you will walk out of the store without buying, then it indicates “Free”: The reasoning is that if you were not going to buy it anyway, there is nothing lost in letting you have it for free. If it predicts that if it indicates “Pay” you will pay for the item, then it indicates “Pay”: The reasoning is that you are prepared to buy it, so letting you have it for free would mean a loss to the seller.

I have not specified how accurate the machine is, but assume that it is somewhere between very accurate and completely accurate. If it is very accurate then when the machine indicates “Pay”, people indeed go on to pay almost all the time, instead of walking out. If it is completely accurate they go on to pay all the time. To keep things

simple (and not to deal with any major problem – just to remove distractions) we will assume that there are no “second chances” with the machine. Once the machine has been used to determine whether you are prepared to pay for something, that is that: Even if you return to the store the next day, the machine’s previous answer still stands.

A society like this would be strange: You would be required to pay for novels that your neighbor got for free. This may seem unfair, but fairness is not the aim here. The aim is to maximize distribution of information with minimum disruption to the economy. If everything works properly, everyone wins because everyone only has to pay for those information products that they would have bought anyway, while receiving all the rest for free.

One criticism of this would be that it only gives you information products that you do not really want – those for which you are not prepared to pay. This is flawed, however. People have a finite supply of money and have to use it to buy a limited amount of things. Just because someone is not prepared to pay for something, this does not mean he/she does not want it, but could merely mean that he/she cannot justify paying for it. People may want many more information products than they can actually afford.

Unlike the previous scenario, this scenario involves a description of how things are done. This requires technology that, at the time of writing, is non-existent, or at least in a very early stage of development. Even if it were technologically plausible, people could probably think up all kinds of issues.⁴

That is not the point, however: This is not intended as a proposal. The point is that, in principle, if mind-reading machines like this were available, the creators of information products could still get their money while we could have all the information products we wanted. Ignoring the practical complications, and I think we can in an argument like this, this shows that, in principle, a situation can exist where the economic activity is the same as with the current scarcity approach to information products, but in which the scarcity has been removed. Nobody loses out, but everyone gets all the information. This would be preferable to the current situation, indicating that however efficient the current approach is in terms of setting prices, it is inefficient in terms of distributing information, and therefore involves an artificial scarcity.

4.3 The Central Committee Scenario

In this scenario, all information products are available free of charge to the public. A central committee decides how much money the creators of information products deserve and give them this money – the money having been collected as taxes from the

⁴ There is a way in which a method with some *slight* resemblance to this might actually be used, and this is discussed in Section 14.6: Individual Buyer Behavior on Page 3. It is not, however, a major part of this proposal.

public. If this works properly, the creators of information products receive whatever society – represented by the central committee – thinks they deserve and the general public can have an unlimited supply of information products.

This is impractical. Many people would associate this idea with communist governments, and the things that happen when people start to control things centrally like this show why it is impractical. With the number of information products being created, this central committee would need a huge bureaucracy behind it. It is hard to see what is going to make the decisions of the central committee fair and correct.⁵ People would have to make decisions, which would inevitably be influenced by prejudice and ignorance. Someone may create a new, very valuable information product, but the central committee may be too stuck in their ways to appreciate it and may think it has low value. Political prejudice could easily creep in, as could corruption.⁶

You might address some of these problems by basing an information product's value on the number of copies people choose to own – if an information product is downloaded by many people, then the creator gets more money – but this creates the further issue of people “gaming” the system by arranging for extra downloads of their work. Also, while it may tell us that one creator should get twice as much money as another, it does not tell us absolutely how much money that should be. There is also the problem that it interferes with the market by trying to reduce everything to numbers of downloads (or something similar) while ignoring the extent of the desire for the product in individuals (someone who downloads the product may really want it or may just have nothing better to do) and the amount of money that people have: A product may be downloaded by a small number of people, who have a lot of money, but the high wealth of these end-users would not benefit the creator in a system that bluntly bases the reward on the number of consumers. Each copy of an information product may be worth a lot because it contains important information, but it is unlikely that a central committee would sort all this out properly.⁷

Even if you try to do various things to make a system like this work, you will probably end up with the kind of mess that results whenever the state becomes this involved in things. Again though, that is not the point: I am not proposing this. The point is that a situation where the scarcity is resolved is conceivable and that, therefore, the scarcity caused by the current approach is artificial.

⁵ Some people might ask what “correct” even means in this context, which just reinforces the point.

⁶ Despite its impracticality, the central committee scenario can provide a useful analogy for the approach which will be proposed, and this is discussed later in Section 24: The Central Committee Scenario Revisited on Page 3.

⁷ It could also be said that such an approach ignores the fact that one information product may have been created in two weeks, while another may have been based on years of research and work – although this really comes down to value as well.

4.4 What the Scenarios Should Have Shown

The above scenarios are impractical, but they should have shown that the scarcity of information products in the marketplace is artificial. We need a practical way of dealing with this. It does not need to deal with it completely: It is acceptable if it partially deals with it. The main requirements are that it makes a substantial contribution to dealing with the problem and is *practical*.

5 Should everything be *free*?

One approach that is not being proposed here needs mentioning. It is being suggested with regard to software, but might be considered relevant to other information products. *The Free Software Foundation* argues that the concept of software ownership is bad for society and proposes that we should change the law to get rid of it.⁸ Anyone who had a copy of a computer program would be free to improve it or distribute copies of it.

Richard Stallman, President of the Free Software Foundation describes this approach in *Free Software Free Society: selected essays of Richard M. Stallman*.⁹ The idea is that software would be more efficiently distributed in society and progress would be faster because people would be free to make improvements. Stallman states that the “free” in “free software” does not necessarily mean that you do not pay anything for software, but instead refers to *freedom* being associated with software, as what is done with it is no longer controlled by “owners” of software – people for whom Stallman clearly has little time.¹⁰ “Free” software may not necessarily be free of cost, because someone who performs a useful service of distributing software could still charge whatever people would be prepared to pay for this service. We can assume, however, that most software would be much cheaper because if anyone charged too much for distribution they would be competed out of the market by people legally passing the software around for less. In fact, in many cases we might expect software actually to be available free of charge.

One objection to Stallman’s approach is that if people do not own the software they write there will be less motivation to write it. Stallman dismisses this by giving examples of various ways in which software could still be created, such as by universities, and saying that the pleasure and challenge of doing it would be a strong motive.

In this article I will not be taking a position for or against Stallman. Instead, I will be proposing an approach to increase the efficiency with which information products are distributed in society which could be implemented more quickly, without any legislative changes and without requiring anyone to take any political position on this issue of whether software should be free. The approach I am taking relates to information products in general – not just software. It is intended to deal with the economic issue, and does not address the one of software modification.

⁸ <http://www.fsf.org>

⁹ Stallman, R. M. (2002). *Free Software Free Society: selected essays of Richard M. Stallman*. Boston: GNU Press. (Also available online at [http://shop.fsf.org/product/free-software-free-society/.](http://shop.fsf.org/product/free-software-free-society/))

¹⁰ Ibid. Chapter 18: Why Software Should Be Free, p121.

6 An Approach that Would Work: The Basic Idea

I will now describe an approach that would work. The approach uses the idea of combining information products in *packages*. The economics of selling products in packages, or bundles, has been described by others previously.¹¹ To show why it will deal with the problem, I will describe it in terms of agreements involving buyers and sellers.

I will use a hypothetical situation.

6.1 The Sherlock Holmes and Hercule Poirot Novels Scenario

Suppose there are two sellers. One of the sellers is selling a *Sherlock Holmes* novel. The other is selling a *Hercule Poirot* novel. The novels are pure information products, so the seller of each can provide as many copies as he/she wishes without extra cost.

Each seller is selling his/her novel for \$1 per copy.

I like detective novels and my favorite detective stories are Sherlock Holmes ones. I intend to buy the Sherlock Holmes novel for \$1. I would also like the Hercule Poirot novel, but not as much as the Sherlock Holmes novel, so I cannot justify the extra \$1 expense.

You like detective novels too, but your favorite detective stories are Hercule Poirot ones. You intend to buy the Hercule Poirot novel for \$1. You would also like the Sherlock Holmes novel, but you cannot justify the extra \$1 expense.

The seller of each novel is going to receive \$1 from each of us, so the two sellers will make \$2 in total. Assume that this represents all of the sellers' sales figures: Nobody else on the planet wants detective novels.

Suppose I ask the seller of the Sherlock Holmes novel to reduce its price. If the seller thinks I am prepared to pay \$1 he/she has little motive to do this. Similarly, you could ask the seller of the Hercule Poirot novel to reduce its price, but again the seller has little motive to comply. We need a way of persuading the two sellers to reduce the prices of the books.

Now, suppose I tell the seller of the Sherlock Holmes novel that, as well as buying it myself, I will try to get someone else to buy it, and I want an understanding that if I can do this then both of us (myself and the other person whom I persuade to buy the

¹¹ There is the article by Bakos and Brynjolfsson that I mentioned previously.

Sherlock Holmes novel) will each be able to buy it for \$0.60. The seller agrees, as all that matters in the end is the total amount of money, and selling two copies of the novel for \$0.60 each earns \$1.20, which is better than earning \$1.00 by selling one copy at \$1.00.

Similarly, you tell the seller of the Hercule Poirot novel that you will try to get someone else to buy it and you ask the seller to agree that, if you can do this, both of you (you and the other person you get to buy it) will each be able to buy it for \$0.60. Again, the seller agrees because this means earning \$1.20 instead of \$1.00.

I want to buy the Sherlock Holmes novel at the lower price, but to get the lower price I need to get someone else to buy a copy.

You want to buy the Hercule Poirot novel at the lower price, but to get the lower price you need to get someone else to buy a copy.

The solution is simple.

- You agree to help me to get my sale of the Sherlock Holmes novel by buying a copy yourself: This means I have made good on my undertaking to get the seller an extra sale and we will both benefit from the reduced price of \$0.60 instead of having to pay \$1.00.
- In return, I agree to help you to get a sale of the Hercule Poirot novel by buying a copy myself: Again we will both get the reduced price of \$0.60 instead of \$1.00.
- At the end of this, each of us has bought both novels, paying the reduced price of \$0.60 each, so each of us has spent a total of \$1.20. The seller of the Sherlock Holmes novel has sold two copies at \$0.60 each, earning \$1.20, and the seller of the Hercule Poirot novel has done likewise, also earning \$1.20.

Let us look at the effects of our agreements with the sellers and each other:

- Instead of getting one novel for \$1.00, I have got both novels for \$1.20. The extra novel has cost me only \$0.20, which seems quite a good deal.
- Instead of getting one novel for \$1.00, you have got both novels for \$1.20. Again, the extra novel only costs you \$0.20, so you got a good deal too.
- The seller of the Sherlock Holmes novel, instead of selling one novel and earning \$1.00, has sold two novels, earning \$1.20, and is therefore \$0.20 better off.
- The seller of the Hercule Poirot has done likewise, and is also \$0.20 better off.

The buyers got a bargain and the sellers got more money. *Everyone has won*. This may make it seem like a trick. The idea that this would involve some sleight of hand would be based on the idea that this is a zero-sum game, in which one party can only gain if another loses. This in turn would be based on the idea that there is a finite supply of products. This is exactly what is not happening. The novels are pure information products and unlimited numbers of copies are available. Instead of trickery, what is happening is that the agreements which we made increased the *efficiency* of the

information distribution system to leverage this ability to produce unlimited numbers of copies.

As well as an agreement between the two buyers and the two sellers to have a price reduction for increased sales, and an agreement between the two buyers to help each other to achieve these increased sales, this arrangement implies an agreement between the seller of the Sherlock Holmes novel and the seller of the Hercule Poirot novel that each seller will reduce the price of his/her information product when it is sold with the other product. This means that if a buyer's preferred product is the Sherlock Holmes novel, then the seller of the Sherlock Holmes novel will reduce its price to try to encourage the buyer to purchase the Hercule Poirot novel as well (assuming that the seller of the Hercule Poirot novel reduces its price as well to get the sale), and if the buyer's preferred product is the Hercule Poirot novel, then the seller of the Hercule Poirot novel will behave similarly, reducing its price to persuade the buyer to purchase the Sherlock Holmes novel as well. Considering things in these terms, a seller has two motives for giving a discount:

- to persuade someone who wants to buy his/her product to buy someone else's product as well, as part of an agreement that the other seller will reciprocate.
- to persuade someone who wants to buy someone else's product, and who has already been offered a discount as part of this agreement, to buy his/her product as well and therefore profit from the agreement between sellers.

We could imagine this situation with more products, sellers and buyers, but it would be essentially the same: Buyers who prefer different products are working together to increase sales of each other's preferred products, causing the sellers to reduce prices and allowing each buyer to purchase his/her own preferred products and those of other buyers with a considerable discount.

Figure 1, on the next page, shows the network of agreements involved in the kind of situation described here. In this diagram the arrows represent agreements as follows:

Arrow (1) is an agreement between two buyers to buy each other's preferred information products to increase sales for the sellers.

Arrow (2) is an agreement between Seller 1 and the two buyers that Product 1 will be sold to the buyers at a reduced price in return for increased sales.

Arrow (3) is an agreement between Seller 2 and the two buyers that Product 2 will be sold to the buyers at a reduced price in return for increased sales.

Arrow (4) is an agreement between the two sellers to sell to the two buyers at a reduced price to help each other increase sales.

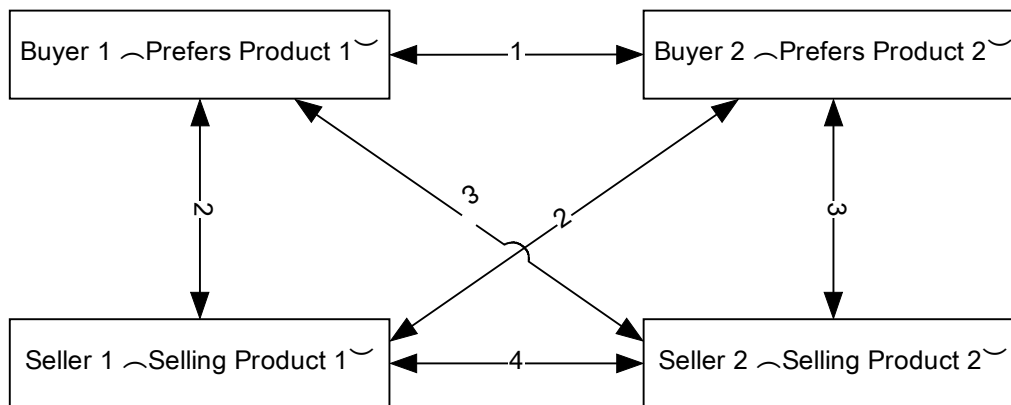


Figure 1: Agreements Involving Buyers and Sellers

This network of agreements may seem complex, but much of this is *implied*, and the Sherlock Holmes and Hercule Poirot example should have shown that the actual understanding is one that four people could easily reach.

Thinking about all these agreements all the time would make things complicated, so for most of this article we will just consider things in terms of the agreement between the buyers to help each other by buying each other's preferred products.

6.2 Requirements for a Workable Process

This process of deal-making could never happen on a large scale in the way that has been described. To make this work we need the following:

- **Abstraction** – We need to *abstract* the process. Humans have already done this kind of thing in other areas. An economy with money is essentially an abstraction of bartering. Every time you exchange money you are bartering with other people who are not even present, the abstraction being so great that you do not even know who these people are.
- **Automation** – A process which involves actual meetings between people will not work. It needs to be able to work between people who are not near each other, and the expense involved in the process needs greatly reducing. Such a process of automation will involve computers and, with our current state of technology, is likely to involve the Internet and websites. An example of this kind of automation is the auction website, eBay.¹² eBay takes the conventional process of auctioning items and automates it using a website on the Internet, so that each exchange can involve people who are far apart with minimal expense (from eBay's point of view) involved in running it.

¹² <http://www.ebay.com>

I will now describe how the approach would work. I will do this without assuming the use of specific technology for now, because it is a general idea. I suggest that the reader imagines this within the context of a website, or websites, on the Internet.

7 Overview of the Process

7.1 Basic Elements

In the selling process we have the three following elements to start with:

- **Information products** – items that are being sold, or the use of which is being sold. An information product is different from a conventional product in that the buyer is paying primarily for information. A *pure information product* would consist of nothing but information, and an unlimited number of copies could be sold without it costing the seller any more than one copy would.
- **Sellers** – people or institutions involved in selling copies (or use) of information products. A seller will generally own any IP involved in an information product, or will have the right to distribute the product on behalf of someone who does (such as an author).
- **Buyers** – people or institutions involved in buying copies (or use) of information products.

I have mentioned the buyer selling “copies” of information products, but this may not always be exactly the case. The main ideas are that the seller is selling *use* of the information product to the buyer. Once the buyer has bought the information product he/she can use it. This could be done by providing the buyer with a copy of the information product, which the buyer might download from a website, or which may be e-mailed to the buyer. Alternatively, the information product may stay online and the buyer may be buying the right to access it as and when needed, or possibly for a limited period. The distinction between different methods like this is not important to this proposal.¹³

7.2 Main Features of the Process

The approach that I am suggesting has two main features:

- **Conditional pricing** – the seller offering the information product at different prices, depending on various conditions. One condition may be the number of people prepared to buy at a particular price, but there is more to it than this.
- **Packages** – a collection of information products that is itself an information product. A package of information products can be bought and sold in the same way as any other information product. Packages may also contain packages, as they contain information products and a package is also an information product. When I discussed the scenario in the previous section, I described buyers who

¹³ An example of a different method of distribution is *WebScriptions* (<http://www.webscriptions.net>), set up by Baen Books (<http://www.baen.com>), a science fiction and fantasy publisher in the USA. WebScriptions allows people to buy subscriptions to new material, which is delivered digitally.

preferred different products agreeing to help each other by buying each other's preferred products. A package is an abstraction of such an agreement between buyers.

These features would need to work together to achieve the desired effect.

There is a third possible feature, **advance selling**, which is not essential, but may play a role in some situations. I will discuss this later, due to its lower importance with regard to the main idea.

8 Conditional Pricing

8.1 The Idea of Conditional Pricing

Conditional pricing means that an information product's price depends on one or more conditions, specified by the seller: The price of the product can change depending on the situation.

The conditions might be specified very generally, in a way that affects everyone the same. For example, the simplest condition would involve offering the product at a given price if a certain number of buyers are prepared to commit to buying at that price. Other conditions, however – those involving packages – could cause the product to be sold simultaneously to different buyers at different prices.

8.2 Demand Based Conditional Pricing

We will first look at the simplest form of conditional pricing: pricing based on demand.

An item could be sold with a price depending on the number of people who have agreed to buy it at that price. The simplest form of this would involve an information product being offered for sale at some price. People can commit to buying the information product at that price. The sale only goes ahead when a certain number of people, the required number being decided by the seller, have committed to buying at that price. The seller will have to choose a selling price and the number of buyers needed. In general, a high selling price would tend to mean a low number of buyers is needed and a low selling price would tend to mean a high number of buyers is needed.

The seller would try to choose a selling price and a required number of buyers that would allow the sale to go ahead, while making as much money as possible. Setting the selling price or the required number of buyers too high would mean that the sale would not go ahead and no money would be earned. Setting the selling price too low would mean that less money would be earned than might have been. One solution to this is for the seller to run a number of different sales of the same information product, each with a particular combination of selling price and required number of buyers. Some sales would have a high selling price and a low required number of buyers. Others would have a low selling price and a high required number of buyers.

This is now all becoming unwieldy, but it can be refined by putting all these different selling price and required number of buyers combinations into a single sale as follows:

The seller runs a single sale of the information product. For this sale, the seller specifies a set of combinations of selling price and required number of buyers. This may be done by specifying each individually, or the seller may specify a mathematical function relating selling price to the required number of buyers. However it is done, every sale of

an information product will have a graph, either discrete or continuous, relating selling price to the required number of buyers.

Each potential buyer specifies what he/she is prepared to pay for the information product. He/she is therefore choosing a point on the graph that I just mentioned. When the conditions for a particular combination of price and required number of buyers are met, transactions occur: Payment is taken from the relevant buyers, who take ownership of the product. This does not mean that the entire sale is completed. More buyers may appear later and more money may change hands again when the condition specified by any given combination of price and required number of buyers is met.

A buyer may be lucky and obtain the product for less than he/she committed to paying. This is because commitment to buying the product for a certain price also implies commitment to buying the product at any price less than that price, should it become available.

Once commitment to buying has been made it could be taken to be indefinite – existing until the transaction occurs; however, this would not be attractive to many people. It would be more realistic to allow the buyer to specify that his/her commitment only exists for a limited amount of time, after which it is automatically withdrawn if the transaction has not occurred, or to withdraw his/her commitment at any time that he/she wishes before the transaction occurs (after which it is obviously too late).

When determining whether the condition required by a particular combination of price and required number of buyers has been met, any commitment that a potential buyer makes to buying at a given price would also be regarded as a commitment to buying at any lower price instead, should the option become available.

The concept being discussed here has some similarity to the idea discussed in a previous article I wrote about conditional investment; however this is only part of the proposal.¹⁴

What has been discussed so far is simplistic, in assuming that the product is offered for sale and once a certain number of people have committed to buying it at some price, the price will drop to that level for some single selling event. This does not reflect reality, because a product might be on sale for an extended period of time, maybe even indefinitely. Suppose, for example, that the seller requires 1,000 people to commit to buying the product at \$5 or above for it to be sold at this price. Once the required number of buyers is reached, all of these 1,000 transactions go ahead. What if someone else comes along after that and wants to buy at \$5? The seller could deal with this by selling to this new buyer for \$5 on the basis that the required number of people has already been reached, but what if the product is going to be offered for sale for many

¹⁴ Almond, P. (2006). *Funding of Ambitious Projects*.
<http://www.paul-almond.com/FundingOfAmbitiousProjects.pdf>.

years? That original 1,000 people will become an irrelevancy. Alternatively, the seller could require this new buyer to wait until another 999 people also commit to buying at \$5, but this is inconvenient: It may take weeks to get to the required total of buyers for some price and someone who missed this sale may then have to wait weeks for more buyers to appear – or pay more. This delay seems artificial.

The seller will not be interested in a single number of customers, but on the *rate* at which the product has been selling. More realistic conditions would take into account the number of recent sales of a product, for example the sales in the last four weeks, and the prices at which those sales occurred. These would then be combined with the numbers of people currently committed to buying the product at various prices. For example, the seller may specify that for anyone to buy the product at \$5.00, a total of 1,000 people must have either bought at that price or above in the last four weeks, or must be currently committed to buying the product at that price or above. There may be 250 people currently committed to buying at \$5 or more and 750 who have bought at \$5 or more in the last month. If this condition is met, then a transaction occurs for anyone currently committed to buying at \$5 or more. With this kind of approach, transactions would be occurring continually.

8.3 What Conditional Pricing Achieves

The idea of people committing to purchasing is that it allows the price of an information product to move quickly to its “correct” place. “Correct” here is simply “correct” as defined by a standard view of capitalism. It will be obvious that in many cases, once things have stabilized, with regular transactions at some price, almost all transactions will occur at that price. For example, suppose the condition for selling at \$5 is satisfied very often. This would imply that the condition for selling at \$4 is *not* satisfied very often – due to an insufficient number of buyers – or the price would not be getting up to \$5. People would soon realize this and few people would bother wasting their time trying to buy at much less than \$5. Some people may be prepared to buy at more than \$5, but they would know that the product regularly sells at \$5, and even if they commit to buying at a higher price, the way that conditional pricing works would mean they end up buying at \$5 anyway. This suggests that the seller may want to bypass all this and just set a fixed price, based on his/her view on what is going to be the best compromise between numbers of sales and money from each sale. Alternatively, the seller may want to use conditional pricing in this way to determine the best price to set, or the seller may be operating in a market where reacting to customer demand makes sense; for example, the seller may be regularly introducing new products, each of which sells to limited numbers of people.

8.4 More General Conditional Pricing

This discussion of conditional pricing may make it appear that items always have to be offered for sale with discounts based on the number of buyers, and that buyers would

commit to buying at some price, rather than just making an immediate purchase. This may not always be the case. The only essential idea of conditional buying is that the price of a product is dependent on *conditions* specified by the seller for that product. These conditions could take account of the number of buyers, but they could also take account of other things.

What has been discussed so far is simply the most basic form of conditional pricing, where the price is altered as sales and commitment from buyers increase, and it is not even the main idea. Conditional pricing is more interesting, and more powerful, when it interacts with packages, which have yet to be described. The seller may opt to sell things at a single price, irrespective of how many people are prepared to buy, except when packages are involved. It is likely, however, that a system of buyers committing to buying at various prices would be used, and I will discuss this later. I will now explain how packages work.

9 Packages

9.1 The Idea of Packages

Packages are the second important feature of the proposal. A package is an information product which contains a number of other information products. A package may be a number of novels, a number of computer programs, some pieces of music, or it could be a mixture of different product types. A package may contain just two information products, or it may have thousands of them. As a package is itself just another information product, packages can be nested: A package can contain packages, which contain packages and so on. The information products in a package do not have to come from one seller: A package could contain products from many different sellers. (See Figure 2, below.)

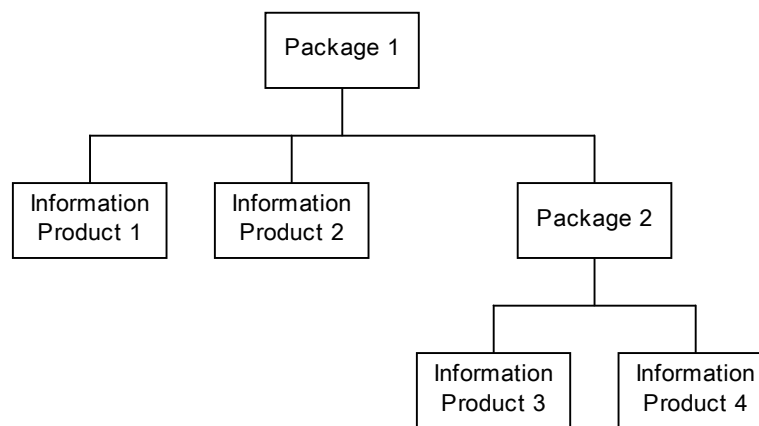


Figure 2: Information Products and Packages

“Making” a package involves defining it. This means that the person defining the package will specify what information products it contains, possibly selecting information products from different sellers.

A package does not need to be defined by someone who has control of the information products in it. A package can be defined by *anyone*, provided that the information products to go in the package are on the market.

For example:

- Seller A is selling a book of poems by Wordsworth.
- Seller B is selling a book of poems by Keats.
- Someone else can come along and define a package containing the Wordsworth book and the Keats book, even though he/she owns the rights to neither.

A package, when it is defined, is merely a relationship between different products. When it enters use it will relate these products to buyers.

A conventional information product, sold by a seller, such as a novel or piece of music, can be considered a *real* information product, while a package can be considered a *virtual* information product.

The fact that anyone can define a package means that there could be an enormous proliferation of packages and, as these can be nested, packages with complicated structures could result. This is no problem though, because no single person would need to know everything about any such structure.

Some packages would be defined by sellers to further their own interests, but many would be defined by buyers.

9.2 Buying and Selling of Packages

A package is itself an information product and can be bought or sold as described earlier for information products in general. Many people could buy the same package. Someone buying a package is really buying a copy of (or the use of) every “real” information product in the package from the seller of that particular information product.¹⁵

The buyer buys or commits to buying the *package* at some price, but the package contains information products from different sellers and, as far as each individual seller is concerned, the transaction between him/her and the buyer is just for that particular information product¹⁶. If a system of commitment to purchasing is in use, then when the buyer commits to buying the package at some price, the buyer is agreeing to buy each of the individual *information products* in that package, if the price demanded by the seller of each of these products is such that the entire package can be bought for that price – or less, if that is possible. If the buyer is going to purchase immediately then the amount paid by the buyer is the sum of the prices of each of the individual information products in the package at that time.

In other words, if a transaction occurs, the total amount that the buyer pays for the package is shared out between the sellers of the individual information products in the package. This sharing out is not based on fairness or any idea of trying to find out what share of the money each seller deserves: Such an idea would be hopelessly inefficient and unworkable and this is what we are trying to avoid. Instead, it is based on what each seller *demands*. The transaction can only occur if the prices demanded by the sellers of all the real information products in the package add up to give an amount that

¹⁵ That is to say, any information product that is not itself a package.

¹⁶ unless a number of information products from that seller are in the package, of course.

is less than or equal to the amount for which the buyer is committing to buying the package or the amount which the buyer is prepared to pay in the case of an immediate purchase. There is nothing in principle stopping a seller from demanding \$1,000,000 for a copy of a single novel in a package with five other novels that are going to sell at \$5.00 each. If a transaction involving such a package went ahead, the seller demanding \$1,000,000 would get almost all of the money, but it is unlikely that anyone would buy such an unreasonably priced package: In reality the seller would be getting 99.998% of nothing.

9.3 Example of Sale of a Package

Here is a simple example of the sale of a package to a buyer.

The package contains three pure information products:

- *Shakespeare's Plays*
- *Marlowe's Plays*
- *The Canterbury Tales*

Let us assume that a system of buyers committing to purchasing is in use, and that the buyer commits to buying this package for **\$6.00** or less.

- The seller of *Shakespeare's Plays* is prepared to sell it in this package for \$2.00.
- The seller of *Marlowe's Plays* is prepared to sell it in this package for \$1.00.
- The seller of *The Canterbury Tales* is prepared to sell it in this package for \$1.50.

The total demanded by all three sellers from this buyer is $\$2.00 + \$1.00 + \$1.50 = \mathbf{\$4.50}$.

The buyer does not need to interact personally with these individual sellers or their price demands. All that matters is that the sellers are demanding a total of \$4.50 and the buyer has committed to buying the package for \$6.00 or less, which is enough. Therefore, the contents of the package are sold to the buyer for \$4.50, and in this instance the buyer is lucky and gets it for less than he/she was willing to pay.

This example does not show the package serving any real purpose, but this purpose relates to pricing of information products and will now be explained.

9.4 Packages and Conditions

Each seller of a real information product in the package can demand what he/she wants for that information product. As discussed previously, the seller of a real information product can define conditions which set the price of the information product according to various aspects of the situation at any time.

I have already discussed the most obvious kind of condition: The seller may make the price dependent on the number of buyers¹⁷. This could also work with information products in packages. When someone commits to buying a package for a certain price (or less) this could be viewed as a separate commitment to buying each information product in the package for a given price. The decision about how much the buyer is committed to paying for each individual information product in the package would be made so as to ensure that, if a transaction does occur, the buyer pays as little as possible, while satisfying each seller's conditions.

This is not the most important kind of condition, however, and it may not even be used by all sellers. More important conditions would relate to *packages*. The seller of an information product could specify conditions which cause people who buy a package containing the information product to get the product at a lower price than people who buy it by itself. The general idea is:

An information product bought as part of a package tends to be cheaper.

The total price paid for the package is the sum of the prices that the buyer pays for the individual information products in the package, and each of these prices would be set according to the seller's conditions and how they take account of this package.¹⁸ If the individual information products in a package are cheaper, as a result of being bought in a package, the total price of the information package will be lower and the buyer can purchase it for less than it would otherwise cost.

A seller does not have to define conditions which take account of packages, but it will often be in the interests of sellers to do so, as I will explain later. These conditions could take account of a number of things:

- If a product is in a package with other products, this fact alone may mean that a discount is offered.
- The number of products in the package may affect the discount offered.
- The other products in the package may affect the discount offered: A product may be offered at a lower price when it is in a package with one product than it is when in a package with another product.
- The discount offered on an individual product may be affected by the number of people committing to buying the package at various prices and/or the number of recent sales of the package at various price – or some other indication of the rate at which this package is selling for various prices, or the amount of demand for it. An information product in a popular package may tend to be offered at a lower price than one in an unpopular package.

¹⁷ or on the rate at which it is being bought, number of commitments to purchasing, etc.

¹⁸ Someone providing a service that allows all this to occur, such as a website, may also charge a fee.

I will discuss the rationale behind all this, and how conditions like this may work, in more detail, later.

An important consequence of all this is:

Different people could buy the same information product at the same time for different prices.

This is because one person may buy the information product as part of a package which causes a certain amount of discount to be offered by the seller. Another person may buy the same information product as part of a package which causes a lesser discount to be offered. Someone else may buy the same information product by itself, not as part of a package, and not get the discounts offered to people buying it in a package. It is deliberate that different people are offered the same product at different prices: The whole idea is based on this, as I will explain later.

The seller would preferably not be making individual decisions about how to adjust the pricing for information products in different packages. This would be done automatically, according to the conditions specified by the seller.

It will be obvious what is in this for the buyer: If the seller is prepared to reduce prices on information products in packages, then buyers can obtain things cheaper by buying in volume. What may be less obvious is what the seller gains from this and why the seller should take part in it. It is actually in the seller's interests to offer discounts on information products in packages, as will be shown in the next section.

I have said that packages could contain packages, so that a package could have the tree structure shown in Figure 2¹⁹, but when a package is being sold the pricing conditions only need to take account of the *real* information products that are in the package.

Figure 3, on the next page, shows the relationship between sellers, buyers, packages, information products and conditions. In this diagram the buying of packages by buyers is shown as a broken line because, although the buyer's experience is of buying the package, the real purchases that occur are of the individual information products in the package.

¹⁹ Page 3.

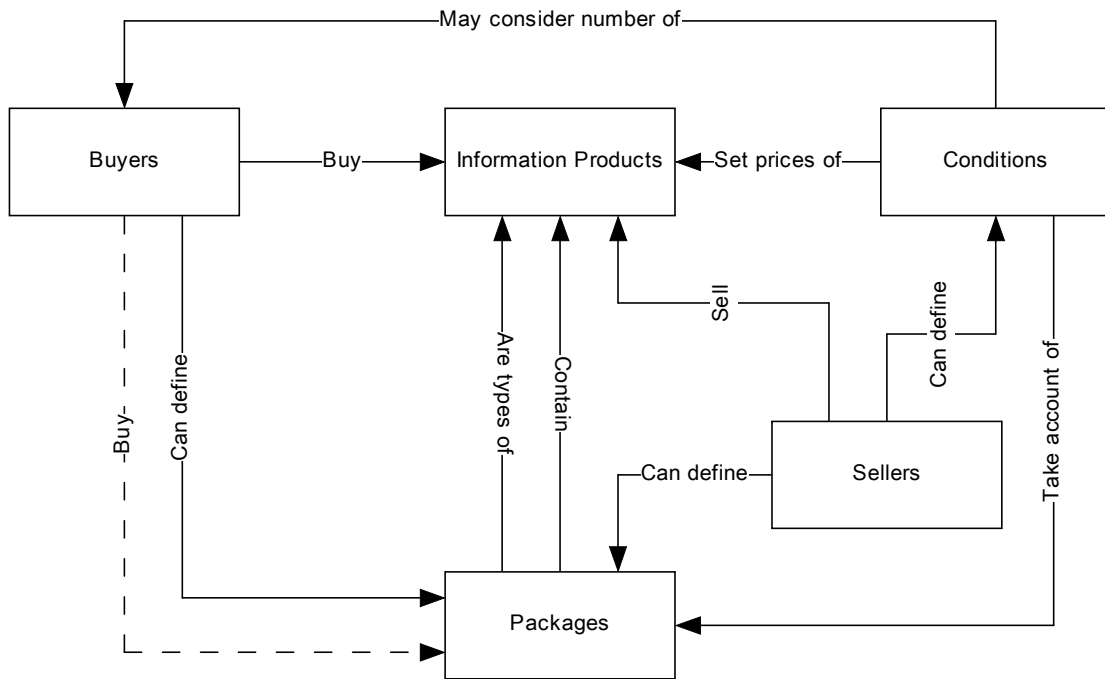


Figure 3: Relationship Between Buyers, Sellers, Packages, Products and Conditions

I will now show what packages are expected to achieve.

10 The Rationale Behind Packages

10.1 How Packages Can Affect Prices

Earlier, I described a scenario of two buyers working together.²⁰ We will revisit that scenario to understand how packages will work.

In that scenario, each buyer wanted a separate product (his/her *preferred product*) and each buyer had an understanding with the seller of that product that a discount would be offered if the buyer helped the seller to increase sales. The two buyers then helped increase sales of each other's preferred products by buying them. The result was that each buyer bought both products for only a bit more than it would cost for one product.

In that scenario, I wanted a Sherlock Holmes novel priced at \$1.00: The Sherlock Holmes novel was my preferred product. I had an agreement with the seller that, if I could persuade someone else to buy the Sherlock Holmes novel, he/she would reduce the price to \$0.60 for both of us. You wanted a Hercule Poirot novel, also priced at \$1.00: It was your preferred product. You had a similar agreement with your seller that if you could get someone else to buy it, he/she would sell it to each of you for \$0.60. The solution was for us to agree to help each other. As well as buying the Sherlock Holmes novel, I would buy the Hercule Poirot novel to help you. As well as buying the Hercule Poirot novel, you would buy the Sherlock Holmes novel to help me. We are both able to earn our discounts, and each of us buys both novels for \$0.60 each, paying \$1.20 in total for two novels, instead of \$1.00 for the single novel that each of us would otherwise have bought.

Suppose the above situation exists and there is a *package* containing the Sherlock Holmes novel and the Hercule Poirot novel. Assuming that a system of commitment to purchasing is in operation, all that is needed is for each of us to register a commitment to buying the package for \$1.20. The package, and our commitment to buying it, represent our agreement to help each other to get extra sales for our respective sellers. I am buying the package to help you get an extra sale of the Hercule Poirot novel. You are buying the package to help me get an extra sale of the Sherlock Holmes novel.

When the seller of the Sherlock Holmes novel sees that we have both committed to buying the package, he/she can give us both the reduced price of \$0.60, as agreed. Similarly, the seller of the Hercule Poirot novel can give us the reduced price of \$0.60, as agreed. Each novel in the package therefore costs \$0.60 to each of us and each of us pays \$1.20 for the package.²¹ (In reality, it is not necessary for each seller to "see" that a

²⁰ Section 6: An Approach that Would Work: The Basic Idea on Page 3.

²¹ If a system of commitment to purchasing is not in use – if items are purchased immediately – this does not change things significantly: It just means that the actual purchase rather than the commitment implies the agreement.

particular pair of buyers is there: The sellers would actually just treat each buyer separately, though they may take into account the existence of other buyers.)

10.2 Ideal Buyers

In the situation just discussed we are considering both buyers as *ideal buyers*.

Ideal Buyers

The concept of an ideal buyer is for simplification and is relevant in the context of a package. **An ideal buyer is one who has a single information product in a package as his/her preferred product. This means that in the absence of the package, he/she would have bought that product, and only that product, individually.**

In the scenario mentioned above, I am an ideal buyer with the Sherlock Holmes novel as my preferred product, meaning that in the absence of the package I would have just bought the Sherlock Holmes novel by itself. You are an ideal buyer with the Hercule Poirot novel as your preferred product, meaning that in the absence of the package you would have just bought the Hercule Poirot novel by itself. The existence of the package, with the special pricing of the products in it, can change all this.

Throughout most of this article I will be assuming that we are dealing with ideal buyers. Reality would not be so convenient, but ideal buyers show what the point of all this is.

10.3 Packages and Abstraction of Agreements

The important aspect of use of packages in the Sherlock Holmes/Hercule Poirot scenario is that the abstraction removes the need for specific agreements between specific people. The package can be defined by anyone, and each seller can specify general conditions that take account of the package. Such conditions can “see” that two people have committed to buying this package containing the seller’s product and view this as an agreement between the two buyers to get extra sales, and therefore cause the price to be reduced accordingly. (Again, in reality, it is not really necessary for there to be a particular pair of buyers: The conditions would actually just treat each buyer separately, though they may take into account the existence of other buyers.) We can view each buyer as having a single preferred product, and getting the other buyer to buy that product as well, in return for a similar undertaking with regard to the other buyer’s preferred product. We do not need to know which buyer preferred which product – who preferred the Sherlock Holmes novel and who preferred the Hercule Poirot novel: Things have been abstracted so much that it does not matter. Nor do the buyers need to meet or even communicate with each other. If someone has defined the package, each buyer can commit to buying it and both can then benefit from any price reduction offered by the sellers. No explicit agreement is needed between the sellers of the two

products either. Each seller is free to define his/her conditions to take account of the package as he/she sees fit.

The package, and the purchases of it or commitments to buying it, are viewed as an abstraction of an agreement by buyers to help each other, but the motives of everyone involved are just based on self-interest. When an individual buyer commits to buying the package, and agrees to help “make things work”, that buyer really just wants to get the package at a low price.

One question that may be asked at this point is this: How do we know that the motives of each buyer in committing to buying the package agree so conveniently with what we want them to be? That is to say, how do we know that each buyer is an ideal buyer? This will not be a problem, and I will give a better answer to it later. For now, I am assuming this optimal situation as nothing more than a simplification.

10.4 More General Packages

A package does not have to contain just two products. In fact, for a system like this to be very successful, packages would need to contain large numbers of products. A package does not need to have just two buyers purchasing it or committing to purchasing it: It can have varying numbers of people buying it or committed to buying it at various times. Popular packages may be bought by large numbers of people.

We can generalize this for a package containing p products with n ideal buyers. Each of the n ideal buyers is assumed to have a single preferred product out of the p products, but because the package is available, each is buying the entire package of p products as part of this abstracted agreement. It is assumed that each of the p products is equally popular, so that for each product there are the same number of buyers (n/p) with that product as their preferred product. This is simple, as an example will show.

Suppose a package contains 5 products ($p=5$), which we call “Product 1”, “Product 2”, “Product 3”, etc. and has 100 ideal buyers ($n=100$). For each product there are 20 ideal buyers (n/p) who would have otherwise just bought that product and who are buying the entire package because it is available.

So:

For Product 1, 20 ideal buyers have it as their preferred product: There are 20 ideal buyers who would otherwise just have bought Product 1, but are buying the entire package because of the system that is operating here.

For Product 2, 20 ideal buyers have it as their preferred product, and so on for each of the five products.

That is to say, each product is the preferred product of an equal number of ideal buyers.²²

²² This is a simplification.

11 Looking at the Numbers

11.1 An Optimal Situation

The idea of packages is that people buy many more information products, but for much less money than it would cost to buy them individually, and sellers make money by charging people something for the increased number of information products. Society as a whole benefits from the reduction of information scarcity and the more efficient distribution of information products.

An obvious question is: What sort of price reductions can be achieved? I cannot give a definite answer to this because the seller would want to make something from the arrangement and the seller would need to decide this. In addition, some system such as a website would be needed to bring sellers and buyers together and allow for the making of packages: Whoever operates the website would want to make something out of it too. Furthermore, real buyers will be less than ideal.

We can only examine the situation in which packages are as cheap as theoretically possible. This is the situation in which sellers only want to make the same amount of money that they would have otherwise made, the website or other system on which this is all based is not charging anything, all products are pure information products and all buyers are ideal buyers. This will not give a perfect answer, but it is where competition would be pushing things, and it may give an idea of the potential of what I am suggesting.

Let us consider the earlier example of two ideal buyers, me with a Sherlock Holmes novel as the preferred product and you with a Hercule Poirot novel as the preferred product, and a package containing both novels.

Assuming that the Sherlock Holmes novel costs $\$X$, without the package the seller would have just sold it to me for $\$X$, earning $\$X$. If we are both to buy the package containing this novel, then we are both buying the novel. The seller now needs to make $\$X$ from two sales, so he/she would need to charge at least $\$X/2$ for each copy of the Sherlock Holmes novel in the package.

This means that, in principle, for a package containing two products, the price per product could be halved, so that the package would cost as much as one product.

If we have more than two buyers this does not change things directly, when we are considering things in this simplified way, because the proportion of buyers preferring each product will be the same. For example, if we had 100 buyers, we would consider this as 50 of them preferring the Sherlock Holmes novel and the other 50 preferring the Hercule Poirot novel: It would just be like 50 buyer-pairs of the type that we have been considering. *The price reduction does not come from packages having lots of buyers.* This is important for anyone who is confusing this with simple bulk buying. I should point

out, again, that what we are considering here is a simplification. (There is one respect in which the number of buyers is likely to have an effect, but it is more of an indirect effect and I will discuss that later.²³)

We will now consider how the numbers work out for packages with larger numbers of products:

Consider a package containing p products, with n ideal buyers. Each product has n/p ideal buyers who have it as their preferred product.

Consider one of these products, which would normally sell for $\$X$. There are n/p ideal buyers with this product as their preferred product, so without the package being involved, the seller would normally have only sold the product to these n/p ideal buyers, earning $\$(n/p)X$. The seller now has n ideal buyers, and still needs to earn $\$(n/p)X$ from them. This can be done selling the product for $\$X/p$.

If all sellers of products in the package sold their products at the same price ($\$X/p$) this would make the total price of the package of p products $(\$X/p)p = \X – the price of a single product, the same as when we had just two products in the package.

This means that, assuming an optimum situation:

The price of a package does not depend on the number of products in the package, but is approximately the cost of a single product in the package.

Again, in the general situation, the number of ideal buyers is irrelevant to pricing in such a simple model (though as I said, it is relevant to a more realistic consideration).

This is an extreme result! It suggests that there should be situations in which we should all be able to buy vast quantities of information products for approximately the price of a single information product – and this is not assuming that sellers give away any money, but merely that they earn what they would have otherwise earned anyway.

11.2 Real-world packages would not be optimal

If you are a seller of information products reading this, it may sound untenable. This may sound as though I am suggesting that you should be prepared to sell your entire collection of information products to a customer for the price of a single information product. I want to be clear that I am suggesting no such thing. The consideration which has been made here is for an idealized situation, in which each buyer would only have bought one of the information products in the package and for a package with a large number of products this means that any single product would never otherwise have been bought by most buyers of the package.

²³ Section 14.2: Number of Buyers of the Package on Page 3.

Some packages would be far from optimum in this way, and would give no advantage to the buyer. For example, suppose we have two products, Product A and Product B, and everyone who buys one of them also buys the other. The simplified, optimum situation assumed so far would not exist here, because every buyer of such a package would have bought both products anyway: There are no ideal buyers or preferred products. Most packages would not match either of these best case or worst case scenarios perfectly, but would be somewhere in-between, and this issue would need to be dealt with by sellers, or rather by the conditions that they specify. The issue of less than optimal packages will be discussed later.²⁴

²⁴ Section 13: Real-World Packages on Page 3.

12 Why not just rely on the market?

12.1 The Idea of Just Relying On the Market

Some people may ask if packages are really necessary. If information products can be produced in huge quantities for not much more than it would cost to produce them in small quantities, why not just rely on market forces to reduce prices? If the price of a product is low enough, many people will buy it anyway, and if the product is very close to being a pure information product, the price can be made very low. Why do we need more? If you have such a view, I am going to try to persuade you in this section. If I have already managed to persuade you that we would actually need a packages-type approach, rather than wasting your time with such an argument, you may wish to proceed to the next section, 13: Real-World Packages, on Page 52.

An argument to support this objection might go as follows.

The idea of the proposal is that many people own large quantities of information products, bought for not much more than it would cost for small quantities, and that this purchasing allows prices to be reduced. For this to be desirable to many people, many people would have to find it desirable to own large quantities of information products if the effective cost per information product is low; however, this would not need packages to achieve it. In a society where the cost per information product was very low, all the people who would find packages so attractive could just buy all these information products individually at the low prices and get the same benefit. The increased sales from the low prices would in turn justify those low prices.

Sellers could bring this about by reducing the prices of information products as more people buy, or as the rate of purchase increases. As the rate at which an information product is purchased increases, the price decreases and the product becomes attractive to more people who would not have bought it at the previous, higher price: The price reduction causes sales which can cause a further price reduction. The price of a product could also be decreased, in principle, more directly by the seller simply reducing it to some level where he/she predicts that the combination of the price and volume of sales earns most money for the seller – and the tendency for more people to buy when the price is lower should mean that this price is very low.

Ultimately, we might expect everyone to own many products, as the cost per product is so low – and if we do not expect that, why would we expect people to want to buy packages which would offer the same value for money?

We might use conditional pricing here, but without using packages. Many people would be able to commit to buying some product at a very low price, and when enough people have committed, the seller's conditions can reduce the price, based on nothing more than many people wanting the product, and without any consideration of packages. If

many people each committed to buying many products like this, and the sellers' conditions gave lower prices in this situation, all these products could be bought very cheaply. If this happens for most products, then many people can buy many products for very low prices, achieving what packages are supposed to achieve.

12.2 Problems with Just Relying On the Market

One problem with this idea is that, as it is described here, people would need to individually buy large numbers of information products. The time taken to arrange each purchase could be considered an extra cost, and it may not be worth it. This is, admittedly, not an insurmountable objection. We might imagine something like packages being used, but without bothering about featuring them in pricing decisions, just as a convenient way of buying many products with minimal effort.

Another problem with the idea is that it would need many people to commit to buying a product for any appreciable price reduction to occur: It only starts to work when statistically significant numbers of people get involved. This contrasts with using packages, which are not, in principle, dependent on large numbers of people. Instead, packages can use the interaction²⁵ of a small number of buyers and sellers to get prices down: The example of the Sherlock Holmes and Hercule Poirot novels involved interaction of just four people. Of course, it would be desirable for large numbers of people to get involved later, but this lack of dependence on statistically significant numbers makes it easier for things to get going.

A more serious problem with just relying on the market is that it allows people to “defect” and gain from the process “parasitically”. Here are four general ways in which information products may be available to an *individual* in a society:

1. Information products are always expensive.
2. Information products are cheap to buy individually.
3. Information products are cheap, but only when you buy many products.
4. Information products are free of charge.

Let us assume that information products are equally cheap in 2 and 3, the only difference between them being the requirement to buy in volume in 3, and let us consider things in terms of how desirable they are to the buyer. I am will ignore 4 (*Information products are free of charge*): It would require some huge philosophical shift in the idea of ownership that the sellers would probably not like²⁶ – and if that is possible we need do nothing else anyway, as we would already have an information-rich society.

²⁵ or potential interaction: See Appendix 1: Special Case of a Package with a Single Buyer on Page 3.

²⁶ This is an understatement.

Everything being discussed in this article is aimed at ending the situation in 1 (*Information products are always expensive*). This is the worst situation for the buyer. The idea in the proposal is to use packages to bring about the situation in 3 (*Information products are cheap, but only when you buy many products*). From the point of view of an individual buyer, however, this is not the best situation: The best situation for an individual buyer would be 2 (*Information products are cheap to buy individually*). After everything I have said to justify the idea of packages, this may seem strange, but I am not saying that 3 (*Information products are cheap, but only when you buy many products*) is not very desirable – just that 2 (*Information products are cheap to buy individually*) is *more* desirable. As an example, given a choice of being able to buy any 1,000 information products you like for \$0.10 each, or being able to buy any information products you want *individually* for \$0.10 each you should choose the second option: You can use it to buy 1,000 products if you really want to do so. *From the point of view of any individual buyer*, the idea we are now discussing, of just using the market, possibly assisted by conditional pricing, to get the price reductions, if it achieved the price reductions, would not bring about the situation in 3 (*Information products are cheap, but only when you buy many products*). Instead, it would bring about the situation in 2 (*Information products are cheap to buy individually*).

It may seem strange that individual buyers are being offered 2 (*Information products are cheap to buy individually*), when the price reductions can only occur if many people each buy many products, and it should concern us, but that is how things are from the point of view of a single buyer. If many people have bought lots of products or have committed to buying at some price, and pushed their prices down, there is nothing to stop a single buyer from taking advantage of this to buy a single product at the low price: From the point of view of a single buyer there is no requirement to buy more than one product to exploit what everyone else has achieved. This is offering individual buyers too much freedom.

This situation in 2 (*Information products are cheap to buy individually*), if it could ever be achieved, would actually be more desirable to the individual than 3 (*Information products are cheap, but only when you buy many products*): It is more desirable, to the individual, than what is offered by packages. This may seem an advantage, but it is not. It is unworkable for 2 (*Information products are cheap to buy individually*) to apply to individual buyers. The idea of packages does not try to create this situation, instead requiring people to buy packages to get discounts, because no matter how desirable it is to an individual buyer, it is impractical to try to achieve it. Instead, the idea of packages tries to achieve the next best thing, 3 (*Information products are cheap, but only when you buy many products*), the main idea being to get away from the worst case scenario, 1 (*Information products are always expensive*), in which our society is at the time of writing.

12.3 Suppose that just relying on the market worked

Some people may doubt all this, arguing that no problem is caused by just relying on market forces – on low prices causing sales and justifying the low prices – without anything like packages, so I will try to show that there is a problem.

Suppose we rely on this idea. Let us be optimistic and assume that this has already had its desired effect: A large number of products have each been bought by many people. All these products were originally priced at \$1.00 each, but because of the huge number of purchases, they are all now priced at \$0.01 each: a huge price-drop. This could only have happened for many products if all these products were being bought in large numbers – if there were a lot of people who were *each* buying lots of products. Now that the price has dropped, suppose you particularly want just one of these products. You can buy it for \$0.01. There is no need for you to buy many other products to get the price down: Everyone else has already done that for you. It may be attractive to get lots of products at a hugely discounted price, but it is even more attractive just to get the hugely discounted prices on a small number of products and save a lot of money. If we think of some kind of society-wide agreement as being in effect to buy lots of products to get the prices down, you would be defecting here and acting parasitically.

Your own intentions would be nothing special. You should expect many other people to have the same idea of just buying a small number of products at the low prices. If each person is buying only a small number of products, it is impossible for most products to sell in very large numbers: That can only happen if each person is buying many products. Sales of products must therefore decrease. This in turn causes sellers to put the prices back up. This does not mean that you are causing the seller of the single product that you bought to put the price back up: You helped that seller and gave him/her a reason to keep his/her price down with your single product purchase. It is the sellers of the thousands of other products that you did *not* buy whom you are causing to put the prices up.²⁷ Similarly, other people are going to cause the prices of any products that you want to go back up, by not buying them either.

Even if we think that a simple pricing approach would somehow work, and give us low prices on products, many individuals would just take advantage of the low prices to buy the limited number of products that they *particularly* want, forcing prices back up. In fact, it is unrealistic to think that things would even get this far. The tendency of people to defect like this would oppose any decrease in prices and would start limiting any process of price reduction immediately, causing it to halt at some point.

²⁷ I admit that this is stretching the definition of the word “cause”, but I think readers will understand what I mean.

This process of price reduction caused by sales may not halt right away. I accept that many people *would* buy more products if the price were reduced. All these products would have to have some non-zero value to people to make the proposal in this article viable. None of this is based on the idea that people would not *want* all the products that they choose not to buy if offered to them individually, even at low prices. The problem is that there are competing uses for people's money. People may choose to spend it on things other than information products. Even in a very advanced information economy, in which almost all money is spent on information products, there is competition between owning information products and having free time: It is conceivable that when offered all these information products at low prices, many people would instead opt to work less and earn less money, which they use to buy the vastly cheaper information products – choosing to be time-rich instead of information-rich: a situation that does not benefit the sellers. There is also the issue that in a society in which information products were the main economic product, this would reduce the supply of them or compromise them in some way. This is not going to arise on a wide scale.

Things get no better if we assume that commitment to purchasing is in use. Lots of people could commit to buying a product at some low price, entitling you to buy some single product at a low price, but all you need to do is commit to buying that single product to get a huge discount: You do not need to buy many products, as everyone else is doing. The reality, of course, is that *other people would think of this too*.

12.4 An Example of the Problem

We can see what the problem is if we consider an example and assign some value, rather than just a price, to a number of products.

Suppose there are ten pure information products: Product 1, Product 2, Product 3, ..., Product 10. The products are being sold conventionally, and nothing has happened to reduce the prices. Each product is individually priced at \$1.00. The total cost of buying all the products would be $10 \times \$1.00 = \10.00 .

Suppose that each product has a financial value to you – the amount that you would be prepared to pay for it if buying it individually.²⁸ Product 1 has a value of \$1.50 to you, meaning that purchasing it for \$1.00 is rational. Each of the other products has a value of \$0.30 to you, so the price of \$1.00 for each of these is too high: It is not rational for you to buy anything except Product 1.

Suppose now that the products are available in a package: You can buy all ten products for some price. How much should you be prepared to pay for this package? Product 1 has a value of \$1.50 to you. Each of the other nine products has a value of \$0.30 to you,

²⁸ Note the specific use of the word “value” here.

giving a total value to you, for the package, of $\$1.50+(9\times\$0.30)=\$4.20$. It is therefore rational for you to buy the package when it is priced at $\$4.20$. As there are ten products in the package, this means it starts to get rational for you to buy the package when the average price of a product in the package, when bought as part of the package, is $\$0.42/_{10}=\0.42 or less. Therefore, if each of the ten items in the package were priced at $\$0.42$ or less by its seller's pricing conditions, it would start to become rational to buy the package.

Now, suppose we do not have packages, and we just rely on the market reducing prices: Lots of people buying or committing to buying at some price are supposed to make it possible to buy each of these ten items at a reduced price. Suppose that, by this happening, each of the ten items had a price of $\$0.42$. It would be rational to buy Product 1, because it has a value of $\$1.50$ to you, but it would not be rational to buy any of the other nine products, because each has a value of only $\$0.30$ to you: $\$0.42$ is too much. You would therefore buy only Product 1 and you would not buy any of the other products. For you to buy any of the other products, their individual prices would need to be $\$0.30$ or less.

This should have shown that it can be rational to buy a package, but irrational to buy each of the items in the package individually, even when the individual price of each item is the same as its price in the package. If we just relied on the market to reduce prices, *this would have to achieve much better price reductions than packages* to get buyers to make the same purchasing decisions. However, people need to buy these products to get the price down in the first place, so there is a problem: Relying on large numbers of individual purchases has a limiting effect on the very thing – purchasing – that is supposed to cause it to happen by getting the prices down.

12.5 Carrying Forward Rationality

For you to buy a package, all that is required is that the total cost of the package should be low enough to make it rational to you. For you to buy each of the products in that package individually, the price of every single product must be individually low enough to make it rational to you. With a package, if one product has particularly high value to you, and is particularly cheap in the package, the low price on this product reduces the total price of the package and can encourage you to buy the other products in the package, in turn reducing the price of the package for other buyers. Any purchase of a product needs to be rationally justified, and a package allows “excess”, rational justification (to you) for the purchase of one product to be “carried forward” to increase the rationality (to you) of buying another product. The package links the rationality of purchasing for a number of products.

In the absence of packages – when we just rely on lots of purchases bringing the prices down with individual purchases – rationality cannot be carried forward between

different products like this. The only thing that reduces the price of a product that you want to buy is lots of other people buying, or committing to buy, that same product.

It may appear that a package merely achieves *dilution* of rationality – that it makes one product more desirable to purchase by making another less desirable – but this is not the case, because the interaction²⁹ of buyers at the same time increases the total amount of rationality involved in the purchase: The excess rationality can be created by the package in the first place.

The carrying forward of rationality removes the hindrance caused by people who are prepared to pay more than you. For an information product to sell at some price, the total income to the seller from everyone who buys the product at that price has to be greater than the income from selling it any other price. You, and many other people, may place some value on the product, but a smaller number of people may place a much higher value on it. This value may be so high that selling the product at this higher price more than makes up for the increased sales that would be obtained by selling to you and the others who are prepared to buy it at the lower price. These people who are prepared to pay more than the value you place on the product are preventing it from being sold to you at a price low enough for you to buy it. When rationality for purchase of a product can be carried forward, the high value that these people place on that product can be carried forward to other products, helping to reduce their prices. This creates excess rationality for the buyers of these other products, which can be carried forward to reduce the price of the original product.

12.6 An Example with Specific Buyers and Sellers

As before, suppose there are two novels – a Sherlock Holmes novel and a Hercule Poirot novel – each sold by a different seller and priced at \$1.00, and that I particularly want the Sherlock Holmes novel and you particularly want the Hercule Poirot novel.

This time, suppose also that each of us places a value on the two novels. I value the Sherlock Holmes novel at \$1.00 and the Hercule Poirot novel at \$0.45. You value the Sherlock Holmes novel at \$0.45 and the Hercule Poirot novel at \$1.00. The total value of both novels to each of us is $\$1.00 + \$0.45 = \$1.45$. (See Table 1 on the next page.)

²⁹ or potential interaction: See Appendix 1: Special Case of a Package with a Single Buyer on Page 3.
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Product	Price	Value to Me	Value to You
Sherlock Holmes novel	\$1.00	\$1.00	\$0.45
Hercule Poirot novel	\$1.00	\$0.45	\$1.00
Total	\$2.00	\$1.45	\$1.45

Table 1: Prices and Values for Two Products

Suppose, as before, that the products are put in a package. Each seller prices his/her product, when bought in a package, at \$0.60, so it costs each of us \$1.20 to buy the package containing both novels. Each of us valued the two novels together at \$1.45, so it is rational for us to buy the package for \$1.20.

We have both managed to buy two novels that we value at \$1.45 for \$1.20. This is doing better than buying just one novel valued at \$1.00 for \$1.00 in the absence of packages. Each seller has earned \$1.20 (\$0.60 from each of two novel sales) instead of just \$1.00 from selling his/her novel individually. We are better off and the sellers are better off.

Now, let us consider trying to get this to happen *without* packages. Somehow, we want to get a better situation than the one with which we started, but by only selling the novels individually.

- The highest value that either of us places on a novel is \$1.00. Each seller has no chance of selling his/her novel for more than \$1.00. Neither of us would buy anything.
- If each seller sells at \$1.00 then we have the situation with which we started where each seller just makes \$1.00 from each sale and each of us just gets a novel we value at \$1.00 for \$1.00.
- Suppose each seller reduces his/her price to give us more value for money. If each seller reduces his/her price so that it is less than \$1.00, but still more than \$0.45, each seller will still only get one sale – as each novel is valued at \$0.45 by one of us, making the price too high to get both of us to purchase. This would give us better value for money though, as the novels would cost less. Each seller, however, is reducing his/her price and not getting any extra sales to justify it: This causes the sellers to lose money. It will not happen.
- The sellers could try to persuade both of us to buy each novel by setting the prices low enough. Each of us values one novel at \$1.00 and the other at \$0.45, so to sell his/her novel to both of us, each seller would have to price it at \$0.45. If both novels are priced at \$0.45 then it is rational for each of us to buy both novels. Each seller will now sell two novels, instead of one; however the amount that each seller will earn is only $0.45 \times 2 = \$0.90$. This is less than what each seller would earn by just selling a single novel at \$1.00, so this will not happen.

- Some readers may think about each seller selling his/her novel at a different price to each of us. For example, the seller of the Sherlock Holmes novel may demand \$1.00 from me, but only \$0.45 from you; however this requires each seller to know the motives of each buyer. It is actually a variation on the mind-reading machine scenario discussed earlier.³⁰ While this cannot be ruled out in principle, the extreme difficulty of doing it should be recognized. Even if it were viable, this would be a departure from just relying on low prices causing sales anyway.

When the novels are sold individually, all the possible ways of improving the situation for sellers and/or buyers, except one, fail absolutely on basic economic grounds. The one way that does not fail on basic economic grounds has need of some mind-reading process, meaning we should question its practicality, and in any case it relies on more than just the market. This should all have shown *that there are situations which cannot be improved by changes to product pricing, when the products are sold individually, but which can be improved by packages.*

It should be noted that in the above situation, when the products are being bought individually, each of us is an obstruction to a product being available to the other at a price that does not exceed the value we assign to it. My assigning of a value of \$1.00 to the Sherlock Holmes novel is what prevents it from being available to you at a price that does not exceed the value of \$0.45 which you give it.

12.7 Rationality for Groups and Individuals

All of this happens because if we rely just on the market and pricing to reduce prices, they will only decrease if society as a whole does the most rational thing, which is to buy many products per person; however, the most rational thing for an individual to do is to buy just a small number of products at the discounted price that has supposedly been achieved by the rest of society. Society, however, is made up of such individuals. There is a disconnect between what is rational for society and what is rational for individuals, and this situation cannot come about.

The proposal in this article is not intended to save people money: It is intended to increase efficiency of information product distribution, which is a completely different objective. We would only start thinking that we could do the same thing by relying only on low prices causing a high volume of sales if we confused the two objectives.

That said, if the price of a product is decreased, we might expect more people to buy it, causing sales that would not have otherwise occurred – although this will probably come to a halt at some point. A seller might, however, take account of this effect in his/her pricing conditions by giving some discount on a product that is related to the

³⁰ Section 4.2: The Mind-Reading Scenario on Page 3.

volume of sales or the rate of sale, independently of any considerations about the normal working of packages. This should not be viewed as the major reason for price reduction: Such considerations should play a minor role.

13 Real-World Packages

13.1 Anti-Ideal Buyers

I will define another type of buyer – the *anti-ideal buyer*.

Anti-Ideal Buyers

I previously defined an *ideal buyer* as one with a single *preferred product* in a package. Ideal buyers are the best buyers for making packages effective. *Anti-ideal buyers* are the worst.

An anti-ideal buyer is a buyer who, in the absence of a package, would have bought every information product in the package anyway. The existence of the package has made no difference to the actions of the anti-ideal buyer, except to mean that he/she may be able to buy the package for less than he/she would have had to pay if buying all the products individually. (He/she will not be able to do this if appropriate pricing conditions are in effect.)

13.2 Ideal and Anti-Ideal Packages

So far I have been discussing an optimal situation; however real-world packages will rarely meet this optimal standard. The buyers of a package could behave in many different ways. Buyers do not have to be ideal or anti-ideal: They can be somewhere in-between.³¹ A buyer may be *almost* ideal because in the absence of a package containing many products, he/she would have bought only a small number of those products. A buyer may be *almost* anti-ideal because in the absence of a package containing many products, he/she would have bought *almost* all of them.

For simplicity I will categorize packages according to two general types:

- **Ideal Packages** – These are the sorts of packages already discussed. Each buyer of such a package is an *ideal buyer*. Such packages will tend to cause extra sales for the sellers of individual information products in the package, because by definition almost all the products purchased by each buyer are ones that he/she would not have otherwise bought. This optimal package situation is described by the mathematics already discussed and, *in principle*, allows sellers to decrease the prices of their information products so much that the entire package can be purchased for the cost of a single product.

³¹ This is why I did not use the terms “non-ideal buyer” or “un-ideal buyer” to refer to buyers who are the opposite of ideal buyers.

- **Anti-Ideal Packages** – These are packages which are as far as possible from meeting the criteria of an ideal package. Each buyer of an anti-ideal package is an *anti-ideal buyer*. He/she does not have a single preferred product. Instead, in the absence of the package, he/she would have gone to the other extreme and bought *all* the information products in the package individually.

Most real-world packages will not be ideal or anti-ideal. What makes a package ideal or anti-ideal are the motivations of its buyers, and most real-world packages will have a combination of buyers, each of which is somewhere between being an ideal buyer and an anti-ideal buyer: There will be elements of the ideal and the anti-ideal in most real-world packages.

A package could have anti-ideal characteristics for a number of reasons.

There could be a strong commercial association between the products in the package, so that anyone who buys one of the products tends to buy others in the package. An example of this would be a series of books with readers who tend to buy the entire series. A package containing all the Harry Potter books would have anti-ideal characteristics because Harry Potter fans are devoted to the series and many people who buy Harry Potter books are going to buy more than one of them, and maybe all of them. A more extreme example of a package with anti-ideal characteristics would be one containing all the volumes of a set of encyclopedias (assuming anyone even bothers to sell them individually to start with): Hardly anyone would buy part of the set.

There may be a situation in which there is no strong, commercial association between the products in the package, so that in general there is no strong reason for thinking that someone who buys one of the products tends to buy others, but it just happens that the typical buyer of the package tends to be someone who would otherwise have bought a large proportion of the products in it. This could happen in two main ways.

One way is by contrivance. I have previously suggested that anyone should be able to define packages. Suppose I want to buy three information products. I could set up a package containing those three information products with the sole purpose of using it myself for that purchase, even though there is no obvious association between the information products, beyond my desire for them. I would then purchase or commit to purchasing the package that I had made, hoping to receive the benefits of buying products in a package. It would not be to the sellers' advantage to treat me as someone who is buying an ideal package, because I would have purchased all the information products anyway: The package merely reflects my intentions.

Another way that this could happen is by simple, random matching of buyer needs with a large number of packages. Suppose that a very large number of packages are made. As an extreme example, suppose that there is a package for every combination of up to three information products on the planet. Anyone who wanted to buy two or three information products could decide what products he/she wanted and then go and find

the relevant package – and because all such packages exist it would always be found. Most such packages would be far from ideal.

An “ideal” package is ideal in that its buyers are ideal buyers. This does not mean that such a package is necessarily ideal in other ways. The packages most exhibiting ideal characteristics would tend to be ones containing products with no relationship to each other.

A package would be “anti-ideal” when the commercial association between products is so strong that buyers of the package would have bought all the products in it anyway. A package would also be anti-ideal if buyers were ones who were going to buy all the products in it anyway, even if there were no package, but who just happen to have found a convenient package which exactly conforms to their buying intentions. This would happen most easily for packages with smaller numbers of products, because fewer combinations of smaller numbers of products are available. This suggests that the packages closest to being ideal would tend to be ones containing many products. Combining both of these suggests that:

The package closest to being ideal contains a large selection of products with no commercial relationship with each other.

This may be true in the sense of the word “ideal” being used here, but is not necessarily true in other senses of it. There may not be many buyers for such a package. Buyers should want packages to exist that are attractive and sellers should want packages to exist that have lots of buyers. Both parties should want packages to be successful in terms of having lots of buyers, yet the most ideal package as described here is one that is unlikely to have much impact on the market.

Being ideal is desirable for a package, but it is not everything. The packages which deliver the best results for sellers may tend to be ones which reach a good compromise between the extent to which the package is ideal and the desirability of the package. There would be some association between the products in the package, but it would not be so strong that anyone who bought one of the products in the package would probably buy a lot of the others. This is not the same as packages containing combinations of products that people do not want. People have a finite amount of money that they can commit to buying information products, and a combination of products that they would find desirable if available more cheaply is not necessarily one that they would otherwise have bought in its entirety as separate products. The limited supply of money, together with the huge number of products and ways of combining products, should make it possible to make packages which have a lot of the behavior of ideal packages, while still representing choices that many people would make.

For a popular, small package – one containing few products – it is more likely that people would be able to afford the entire package, and would have bought all the products anyway, so this may make the package less ideal. However, it should be noted

that even small, popular packages could still have a significant amount of ideal nature. It may be, for example, that two books are about the same kind of subject, but that most people would tend to buy one book or the other simply because there are many books on this subject and there are many possible combinations of two books; however when both of these related books are offered in a package with a significant discount they immediately become desirable.

If a package contains many products, the limitation in people's available money means that few people would ever otherwise buy a significant number of the products in the package anyway, so the package gets closer to being ideal.

Real-world packages will not be ideal, but instead each package will be somewhere on the spectrum between ideal and anti-ideal. It may seem that this would cause problems, as the argument I made earlier assumed ideal packages, but it does not cause serious problems with the concept. It just means that sellers would not set prices on the basis of packages being ideal, but would instead give less of a reduction than would be given for truly ideal packages, on the basis that real-world packages are less than ideal. The seller is likely to deal with each package on an individual basis, making some estimate for each of how close it is to being ideal. All this would preferably be done automatically by the conditions specified by the seller for the sale of an information product.

13.3 The Tendency Towards More Information Products in Packages

I have said that anyone should be able to define packages of information products, and a package is itself an information product and can be put in another package by anyone. Small packages could be combined in packages to make larger packages, and so on. The tendency would be for packages to become large, so more packages would approach the status of ideal packages as time passes. This does not mean that everyone would be able to buy vast amounts of information products for the cost of a single product. People already spend more than that, and the sellers would price information products so that they make at least what they do now and probably more besides. In the long term, it could mean that people could own much larger collections of information products than they now own, for not much more money than they pay now.

14 Real-World Packages and Product Pricing

As I have mentioned, real-world packages would not be ideal, each instead being somewhere on the spectrum from ideal to anti-ideal. Sellers would need to take account of this in pricing of information products.

I have said that sellers would take account of how close to being *ideal* a package is, but it is actually more specific than this. As far as the seller of a single information product is concerned, he/she is just selling a particular information product, someone has put it in a package, and some decision needs to be made about how to take account of that package in pricing of this product. *The seller's interest is in how this relates to his/her own product.* In the discussions about ideal packages so far it has been assumed that there is a uniform distribution of preferred products – that each product in the package is the preferred product of an equal number of ideal buyers – but the distribution may not be like this. Some products in the package may be the preferred products of more buyers than others. If all the buyers are ideal, the package might be better than an ideal package for some sellers and worse than an ideal package for other sellers. This issue is still relevant when the buyers are not ideal.

That is to say, the seller wants to take account of the proportion of buyers of that package who would have otherwise bought the seller's specific product anyway. If this proportion is low then the package is close to being ideal and it is in the seller's interests to offer the information product at a low price to benefit from the extra sales.

The following are just some of the criteria that the seller may use in setting the price of an information product in a package:

- number of information products in the package
- number of buyers of the package
- relative sales figures of seller's products and others in the package
- actions of other sellers
- search engine results
- individual buyer behavior
- other packages

I will now discuss these in more detail.

14.1 Number of Information Products in the Package

All else being equal, a package containing a large number of information products will tend to have the most benefit for the seller of an individual product in that package.

This is because, as discussed previously, assuming ideal buyers, a larger number of products suggests that a greater proportion of buyers of the package had another product as their preferred product, and would have therefore not bought the seller's product, meaning that it is more likely that the package has caused any given sale. This reasoning still has some relevance even in less than ideal situations. The seller may therefore specify conditions which take account of the number of products in a package when deciding how to price individual items in it.³²

A further reason to take account of the number of information products in the package is the limited money of buyers. With few products in the package it is easier for the average buyer, with a limited amount of available money, to buy all of them individually, or at least a large proportion of them. As the number of products in the package increases, this becomes more difficult, making the package closer to being an ideal one.

There is another reason to take account of the number of products in the package. I mentioned that some packages may be close to being anti-ideal and could just happen to match buyers' requirements. For example, if every package of three products is made, it follows that anyone who wanted a particular combination of three products could find a package that just happened to match his/her requirements, even if he/she were going to buy the products anyway. This is against the idea of packages, which is that *packages should cause sales*. If a package has a large number of products, it should be considered evidence against this. This comes from the number of ways of selecting a combination of p products from n products being ${}_n C_p = \frac{n!}{p!(n-p)!}$ – as p increases the number of combinations increases rapidly.³³ As the number of products in a package increases, it becomes less likely that this is going on and the package assumes greater credibility as a causal factor in sales.

14.2 Number of Buyers of the Package

I have said that the number of buyers of a package is not directly relevant: It did not form part of our consideration of the simplified scenario with ideal packages. It can, however, play a part in the sellers' consideration of information product pricing.

A package having many buyers should be considered evidence against it having anti-ideal characteristics and just happening to satisfy buyer requirements. We can see this by considering an extreme situation in which every buyer in existence does not look for available packages, but simply makes a package reflecting his/her specific buying

³² The situation in which there is just one product, being sold without it being in a package, can be considered a special case of this – as a package containing a single product. In such a situation there would clearly be no discount offered due to a package, which agrees with the idea that packages with fewer products should tend to have lower discounts on the individual product prices.

³³ When p gets very large, this does not apply. e.g. when $p=n$ there is only one combination of products available, but when the number of products is so large, hardly anyone would have been able to afford more than a small number of the products in the package anyway, raising the package's credibility.

intentions: Each such package would have only one buyer. As the number of buyers increases it becomes less likely that this is happening: The package assumes greater credibility as a causal factor in sales.

If the number of buyers of a package is going to be an issue in pricing of a product in that package, a decision would be needed about how to count this. If the package will be for sale over a significant period of time, it makes more sense to try to measure the *rate* of sales, as previously discussed. This could be done by counting the number of people committed to buying the package at some price, together with people who bought the package recently, or people committed to buying the package at various prices.³⁴

There is another way in which the number of buyers might be relevant, and it goes back to the simpler idea of demand based conditional pricing that was discussed earlier.³⁵ People will assign different values to an information product. The lower the price of a product, the greater will be the number of people who assign the product a value which is at least its price, and for whom it is rational to buy the product. Cheaper products should therefore tend to have more buyers. A seller may take account of this by giving a discount on the price of a product in a package, based on the number of people buying the package (or something similar). A seller may conceivably make this more general and give a discount on an information product based on its sales figures (or similar) in all packages or no packages. Any such discount will almost certainly be conditional on what sellers of other products in the package are doing. There will be limits to this, because the volume of sales at a low price may earn less money for the seller than the lesser volume of sales at a higher price. A seller may, instead, take the more direct route of just trying to predict what the number of sales will be for any given price, writing the conditions appropriately.

The number of buyers of a package is such a strong and readily accessible indicator of the usefulness of a package that it would probably be used in setting information product prices.³⁶ This means that a system of buyers committing to purchase, rather than just buying immediately, is likely to be in effect.

At the same time, it should be noted that although I have suggested that numbers of buyers would be important in pricing of a package, this is not because it is important in itself: There is nothing that makes a package intrinsically better because it has more buyers. The number of buyers is only important as a *statistical indicator* of the package

³⁴ Some readers may wonder about the situation in which a package only ever has one buyer. As this is an abstraction of an agreement between buyers, does that situation deserve special treatment? This special case is discussed in Appendix 1: Special Case of a Package with a Single Buyer on Page 3.

³⁵ Section 8.2: Demand Based Conditional Pricing on Page 3.

³⁶ The rate at which purchases are occurring, the number of commitments to purchasing or some variation on this might be used.

not just happening to match some specific, arbitrary needs of its buyers. Even if, as I mentioned, account is taken of the purchase being rational to more people at low prices and the number of buyers is used to adjust the price on this basis, the number of buyers is still only being used as a statistical indicator – in this case of the expected response by buyers to price changes. This also applies for the other criteria being discussed here: they are all statistical indicators of the value of a package to a seller, subject to be replaced by better indicators, and should not be confused with actual measurement of it.

14.3 Relative Sales Figures of Seller's Product and Others in the Package

Assuming a package with ideal buyers, if a seller's product normally has higher sales than other products in the package, this would suggest that the proportion of buyers with that product as their preferred product is higher than average for the products in that package. It is these buyers which the seller would have expected to have bought the seller's product anyway, so it reduces the seller's estimation of the number of sales generated by the package.

For example:

Consider the package, discussed previously, containing the Sherlock Holmes novel and the Hercule Poirot novel. Suppose that, when the novels are sold conventionally, for every nine sales of a Sherlock Holmes novel, there is just one sale of a Hercule Poirot novel. Suppose now that ten ideal buyers want to buy the package at some price. It would be reasonable to assume that nine of these people would have bought the Sherlock Holmes novel anyway and that the package is only generating one extra sale for the seller of the Sherlock Holmes novel, who should therefore offer a minimal discount for the package to reflect this. On the other hand, the seller of the Hercule Poirot novel is getting many more sales out of this, and may offer a greater discount.

This kind of consideration assumes ideal buyers, but the same kind of issue would still be present in real-world situations. Sellers who consider their information products more important may reduce prices less than sellers of other products in the package that would otherwise be "parasitical". We should expect this: If the proposal is valid there should be some basic respects, such as this, in which economics is business as usual.

It should be noted that if the proposal in this article were implemented and successful, most sales of information products would probably involve packages and reliable, "conventional" sales figures would be less easy to obtain: It may be necessary to analyze packages instead, as will be discussed shortly.

14.4 Actions of Other Sellers

A package can be considered as an abstraction of an agreement between buyers to cooperate to obtain low prices. It can also be considered an abstraction of an agreement between sellers.

The conditions specified by a seller of an information product in a package may make his/her price reduction conditional on similar price reductions being offered by sellers of other products in the package, so that to reduce the price much the seller would expect the sellers of the other products to be reducing their prices a lot.

This would interact with other methods of setting the price, such as comparing relative sales figures. If another seller's product is very popular, this may justify matching any price reduction offered by its seller. If another product is less popular, its seller may be expected to offer a greater price reduction – to do more of the work in getting sales.

Some readers may have concerns that if all sellers make their price reductions dependent on reductions being offered by other sellers of products in the same package this could cause a pricing deadlock in which the conditions for each seller are waiting for other sellers to reduce prices, while the other sellers are waiting for the same. This is not a serious problem. One way that it could be solved is by the system (such as the website) that is running all this experimentally reducing prices of products in a way that cannot be seen externally by users of the system. The new prices could then be checked to see if they comply with the conditions for all sellers, and adjusted if necessary, before the price reductions are reflected in the real, publicly visible prices. Another way of dealing with this would be for the conditions for a product to “offer” a price reduction conditionally to the conditions associated with other products in the package. This really amounts to the same thing as the other method, with a slightly different view of how communication is arranged. Another method may be for the internal logic of conditions to be examined by software – an approach which could present issues.

14.5 Search Engine Results

Pricing conditions could conceivably use search engines to find out what is being said about information products on web pages.

The number of web pages mentioning two information products could be an indicator of how strong the association is between them. A stronger association would imply that it is more likely that a user buying one of them would have bought the other anyway, so a strong association between a seller's information product and others in the same package would tend to make a case for not reducing the price as much. Similar information about the association between two information products could be gained by looking at web pages mentioning each product for common words and terms. For example, if two information products each tend to be mentioned on pages with lots of words about chemistry it suggests that both information products are associated with

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chemistry. A more sophisticated method might involve software trying to find web pages making recommendations to buy both products.

Web pages could be searched for information about the general public's opinion of a particular product that is in the same package as the seller's product. Reviews of the product could be found, or pages mentioning the product examined for positive words like "excellent" or negative words such as "useless". If another information product in the same package as the seller's product is considered to be a good product by the general public, this counts in favor of reducing the price. This is because a user with a high opinion of this other product is more likely to have it as his/her preferred product (using the simplification from earlier), meaning that the seller is getting extra sales as a result of the package. A user with a lower opinion of this other product is less likely to have this other product as his/her preferred product, meaning that the sales that seller gets from the package are more likely to be ones that he/she would have got anyway.

14.6 Individual Buyer Behavior

Information about purchases or searches by individual buyers could be statistically useful in determining the amount of association between various information products. Privacy issues need to be considered with any method that involves analyzing buyer behavior. It should be noted that just counting sales of packages gives quite a lot of information for statistical use without having to reveal much about individuals.

There is another respect in which individual buyer behavior might conceivably be used, and it is one that should be controversial. Earlier, I mentioned a scenario in which efficiency of information distribution was achieved by use of a mind-reading machine.³⁷ The machine, by knowing the intentions of a buyer, could decide whether to charge the buyer for an information product. I said that the technology to do this does not exist, but there may be a sense in which it could be done partially. Buyers' activity could reveal a lot about them, and this information could be used to build up a profile. In fact, this kind of process is already common in other areas. The pricing conditions for an information product might use such a profile, so that *the price demanded by the seller is adapted to a specific buyer*. This would mean that different buyers would be charged different amounts for the same information product in the same package. If anything like this were used I would expect it to be of limited use. It would be a statistical method and would not give any reliable information about a particular buyer. For this reason, if such a method is used, it may only have a small effect on pricing. There is also the issue that buyers would try to circumvent such an approach to get cheaper prices in various ways, reducing the effectiveness of such a method. I do not think that such a method, with current technology, would be close to the basic idea of packages in terms of

³⁷ Section 4.2: The Mind-Reading Scenario on Page 3.

effectiveness. We should also ask if such an approach would be desirable. I am not advocating it, but merely observing its possibility in principle.

14.7 Other Packages

Pricing conditions for a product may be based on analysis of the sales statistics of other packages containing that product, packages containing other products that are in the package of interest, packages containing combinations of products that are in the package of interest, etc. The idea of this would be to find out what effect a particular product, or combination of products, tends to have on the sales figures for a package.

The conditions might analyze the sales statistics for a package containing different products from those in the package of interest, if there is some kind of association between the products in the two packages. Information about this association could be obtained in various ways; for example by analyzing buyer behavior or using search engines as previously discussed.

As well as the sales statistics, information about the products included in other packages could be of interest, as this could tell sellers something about association between products and similarity between different packages.

An obvious way of analyzing other packages is for the seller to determine how well he/she expects his/her own product to sell in general. For example, suppose the seller's product is Product A, and it is in a package with Product B, Product C and Product D, so we have the package ABCD. The seller may be interested in other packages featuring Product A, such as AEF, AHJK and ALMN. Ideally, many more packages than this would be analyzed.

The seller may also do this for the products of other sellers that are in the package. For example, one of the other sellers' products in package ABCD is Product B, so the seller might be interested in sales figures for packages BOPQ, BRST and BUVW. By doing this for the different products in the package, the seller could get an idea of which products in the package naturally sold well and which sold less, and get an overall idea of how much of a contribution the package may make to sales of his/her own product. The seller may try to compare very similar packages when doing this. For example, if the seller looks at the sales figures for package AEF, he/she may also want to look at the sales figures for BEFG, to see how well his/her own product and another product in the package sell in similar kinds of packages.

The products that are selected for different packages could give information about the degree of association between different products. For example, if a pair of products often appears in the same package, it may imply a strong association between them. This could be taken further by looking at the entire package. For example, if ABCDEF and ABCDEG are packages, it may suggest an association between Product F and Product G, because they are appearing in the same kind of package. This could also work indirectly.

For example, Product A may appear in package ABC and Product D may appear in package DEF and, despite the packages having no products in common, association which has already been determined to exist between the products in the two packages could be used: Product B may be associated with Product E and Product C may be associated with Product F. This may lead to the conclusion that ABC and DEF are similar kinds of packages, with Product A and Product D in similar contexts.

When analyzing other packages, sellers may be interested in the mere existence of such packages, but sales figures may be relevant: High sales figures may give more weighting to a package's existence.

These are only some of the ways in which other packages may be relevant. Things like this could be done at various levels of indirectness, so that a package which does not contain any of the products in the package being considered could still provide useful information.

As I mentioned when discussing analysis of sales of individual products³⁸, if the proposal in this article were very successful, "conventional" sales of individual products might become rare, so that most information about the behavior of individual products in the market would have to come from analysis of package sales.

14.8 General Comments

I have said that the degree of association between the information products in a package would be important. The size of the set of associated information products is likely to play an important part in this. If there is some degree of association between two products, but both products are part of a very large set of similar products that are all similarly associated with each other, then this suggests that it is less likely that someone interested in that kind of product-pair would want *that* pair – making it more likely that the package had a causal role in the purchase. This means that we may take into account the size of this set as well as the degree of association. Many methods of evaluating the degree of association between two products, however, would automatically take account of the size of such a set anyway. For example, if we partly base the degree of association between two products on the number of web pages mentioning both products, *in comparison with* the number of web pages mentioning other pairs of products of a similar kind, or in comparison with the number of web pages mentioning one product in the pair and a different product, then a pair of products which is in a very large set of similar pairs would tend to be assessed as being weakly associated.

It should be noted that we have been discussing ways of *determining* association. Association is, basically, just probability. If someone who buys one product is likely to

³⁸ Section 14.3: Relative Sales Figures of Seller's Product and Others in the Package on Page 3.

buy the other then we would regard those products as strongly associated. Any way of measuring association is really trying to get at this. The association between two products might be different in different directions: Someone who buys Product A may be likely to buy Product B, but it may be that someone who buys Product B is not particularly likely to buy Product A. This might happen, for example, when the information products are books and one book is a commentary on the other: You need the book on which the commentary is based for it to be very useful, but it does not follow that everyone who has that book needs the commentary.

The above criteria and others could be used in ways that interact with each other. A number of methods might be used, each having some affect on the price of an information product. Some methods may also be used to generate information that is used by other methods. For example, one method might be used to generate information about the degree of association between two products, while another method analyzes buyer behavior involving packages containing products with this degree of association.

Purchase of packages could affect a buyer's future behavior. For example, a buyer might have bought two products, Product A and Product B, from the same seller. After buying Product A as part of a large package of products from this and other sellers, having all these products may reduce the buyer's appetite for Product B. This would simply be something that sellers' conditions would take into account. Some types of buyer would not be affected in this way at all, as they are so involved with some subject that they have to own everything they can relating to it. With some buyers this could even work the other way: Getting better value for money might prompt them to spend *more*, as it makes the decision to allocate the money to information products, rather than something else, more rational. This issue may become less relevant as the role of information in the economy becomes more significant, as spending would tend to be on information products anyway, though an economist would really be needed to give a proper view on this.

Some of the methods discussed here, and others that may be developed, may be complicated. Whoever runs a website or other system on which all this occurs may provide some pre-built statistical tools to assist with a lot of this.

It may be that an appropriate view of all this would be a *Darwinian* one: There might be a number of ways in which something like replication, variation and natural selection is occurring. Some of the work already done in Darwinian evolution and computer simulation of it may be of relevance to an understanding of a system like this.

15 Motivation for Creating Packages

Packages might be defined by sellers, buyers or by the owners of the website or other system on which all this occurs. They could be defined by a human or automatically by a computer program. One issue to be considered is the motivation involved in creating packages. This should be considered for whoever is running the website or other system to provide all this, and for sellers and buyers.

15.1 Motivation of Whoever Runs the Website or Other System

Packages created by whoever runs a website (or other system) for all this, possibly automatically, need no justification beyond the idea that this is what their business would be, in the same way that it is in eBay's interests to promote auctions.

15.2 Motivation of Sellers

Packages created by sellers, possibly automatically, have the justification that sellers would want to price information products in packages so as to use the packages to get extra sales that more than make up for the price reduction: Sellers would expect to make money from packages. This can only happen if packages exist, making it in sellers' interests to ensure that they do. This makes it in the sellers' interests to define packages containing their own information products *and those of other sellers* – an idea which may seem strange, but is consistent with what has been discussed so far.

A single seller may do all the work of defining a package, but all the sellers whose information products are in the package would benefit from any sales of the package. The seller who defines the package may demand payment for this work. The seller can easily do this by using pricing conditions that demand more money for the seller's products when the package is one that the seller him/herself defined.³⁹ This should be expected not to make much difference because the initial work in defining the package remains the same no matter how many people buy the package, so an economy of scale would apply for a successful package.

15.3 Motivation of Buyers

Buyers may need more justification to create packages. A buyer may create a package because he/she wants to buy the information products it contains as a package to reduce the cost. It is likely that any real-world conditions for pricing information

³⁹ This would be more complicated if the seller did only some of the work, such as when the seller defined a package that has been incorporated into another package by someone else. It would be up to the seller to decide whether or not to try to deal with all this. A seller could simply choose to ignore the whole issue.

products in packages will take account of how many people are buying the package, for reasons already discussed. This would mean that the buyer would be hoping that other people would want to buy the package, helping to reduce the cost so that the buyer could buy it more cheaply.

There is an issue, however, created by the buyer who defines the package doing work that the other buyers did not have to do, and it is similar to the issue which was discussed for sellers. It may make sense to give the buyer who defined the package an extra discount, based on the commercial success of the package – how beneficial it is to sellers. In this way, we are considering a buyer who defines a successful package to be working as a sales agent for the sellers of the information products in the package, bringing sellers and buyers together to provide a more efficient distribution of information products that makes more money. The buyer may put a considerable amount of work into defining a package that is particularly successful, and if the package results in many sales, the buyer may deserve more of a reward than just a discount when buying the package. It may make sense to make provision for giving an extra reward to the buyer, maybe as free copies of other information products not in the package or as a financial payment. Many people might try to define packages to earn the rewards and this would work like most other things of this nature: Many people would earn a small amount of money, some people would earn a moderate amount of and a small number of people, those who knew how to make the most commercially useful packages, would earn a lot.

I have said here that sellers and buyers would be able to define packages, but “buyers” could really be anyone using the system, whether they are buying anything or not.

16 Commitment or Normal Purchasing?

There are two ways in which potential buyers could purchase packages:

- They could simply buy the package at whatever its current price is. This price would be the sum of all the prices set by the sellers' conditions for all the individual information products in the package.⁴⁰
- They could commit to buying the package at some price. When the sellers' conditions for all the individual information products in the package set the prices of the individual products such that the entire package can be bought for the price which the buyer is committing to pay, the transaction can occur. A buyer may be allowed to withdraw commitment at any time before the transaction occurs.

One or both of these options could be offered to buyers, but one may be more useful than the other, depending on the situation.

If sellers' conditions do not take account of the number of buyers of a package, then there is little reason not to use the first option. The conditions for the information products in the package would set the prices of the products, which would in turn set the price of the package, and that is the price it would have at any time⁴¹: Anyone wanting it could simply buy it.

If sellers' conditions do take account of the number of buyers of a package, or the rate at which it is being bought, the second option is likely to be better. This is because when the package first starts off, the package has no history of previous buyers, causing problems with setting the price and meaning the price may be set higher than it should be. Even if that is avoided, it may take time for people to become interested in the product. If sales are originally slow, conditions which just look at how products are selling may again set the price too high. Having the price too high makes it less likely that many people will buy it, in turn keeping the price high in a vicious circle. This problem could be resolved by allowing buyers to register a commitment to buying at some price. Sellers' conditions could then take account of this commitment when setting the prices of individual products.

It is likely that sellers conditions' would need to take account of the number of people buying the package, so the second option seems more likely to be taken.

⁴⁰ That is to say, for all the *real* information products in the package.

⁴¹ ignoring any changes to conditions.

17 Dealing with Change of Ownership

17.1 The Problem of Change of Ownership

One issue not discussed yet, which is relevant to a real-world implementation, is that of people buying information products and transferring them to each other. By this I do not necessarily mean copyright theft, in which multiple copies are made. It could also be a user having a single copy of a product and transferring ownership to someone else, so that he/she no longer owns it. Such transfer of ownership may not have the same ethical issues that people associate with piracy, as it is more like buying a car and giving it, or selling it, to someone else.

Transfer of ownership poses a potentially serious issue for the proposal. The whole idea of the proposal is that people do not spend less, but instead get more. However, if information products can be transferred between users, someone could buy a package containing a small number of products that he/she wants and a large number of products that he/she does not want. He/she could then give the unwanted products to his/her friends, or maybe sell them at a reduced price. It is also likely that swapping would start. The problem with this is that anyone receiving products in this way is not paying the seller for them and, as they originally came from the package, it means that the package could be costing sales.

17.2 The All You Can Eat Restaurant Analogy

The following analogy is not perfect, but it should make the point about transferring products.

Suppose there is a restaurant serving food on an all you can eat basis. Each customer pays a fixed charge for a ticket entitling him/her to eat as much as he/she wishes on the day that the ticket is issued. A holder of a ticket can leave the restaurant and come back for more food without paying again, provided that he/she shows the ticket on returning to the restaurant.

Suppose that the restaurant really is able to provide practically unlimited amounts of food: They have a *Star Trek* style food replicator in the kitchen.⁴²

It is reasonable for the restaurant to operate on these terms. They could look at how much they would typically earn from a certain number of customers, divide that by the number of customers and that would be a viable price to charge each customer: They may even charge a bit more as customers are getting more. The restaurant could make money doing this.

⁴² Also assume that they have a practically unlimited supply of energy to run it.

Now suppose that customers tend to be generous and, when they have had enough to eat, they tend to leave the restaurant and fasten their tickets to a fence near the restaurant, so that other people can collect these tickets and use them to get food without paying. These people will in turn tend to fasten their secondhand tickets to the fence after leaving the restaurant and so on.

There is now less motivation for anyone actually to buy a ticket, because it makes more sense to see if someone else's previously purchased ticket is fastened to the fence. If the restaurant accepted such secondhand tickets the business would start to fail: The business model relies on the right to eat food not being passed on.

17.3 Resolving the Problem of Product Transfer

It is likely that there would have to be some kind of restriction on passing information products bought as parts of packages to other people.

It is not the passing on of information products in itself that is the problem, but rather *the breaking up of packages*. If someone buys a package of products and transfers ownership of the entire package to someone else, then nothing significant has happened – provided that he/she does not also keep a copy, and that would put us into the area of copyright theft, which I will discuss later. The problem starts when one person can buy a package which can then be broken up and used to service the information product needs of multiple people.

One way of dealing with this is to sell information products in packages subject to the condition that information products are never transferred to other people. A less restrictive condition, which should probably suffice, would be that packages cannot be broken up: Someone who buys a package could transfer all of the products in the package to someone else, or none of them. Conditions like this may be enforced by some kind of limitation in the system. Such a limitation may prevent any transfer of information products bought in packages, or it may just prevent any transfer which would break up a package.

18 Abstract Packages

So far, I have described a package as a collection of information products, each of which can itself be a package, but packages could take a more general form if what I will call *abstract packages* are available. Such a package's definition might be a description of the *criteria* that some collection of products has to meet, so that each buyer could select the products to go into his/her copy of the package, provided that his/her choices conform to the package rules.

Abstract packages could present complications and they would introduce possible issues with regard to pricing conditions, as more freedom in the selection of the individual products by the buyer may mean that everyone buys some unique version of the package, and if we regard numbers buyers as relevant, this may appear to reduce credibility of the package as a causal factor in a purchase.⁴³ However, it should be noted that, when we are thinking about the motivation of a buyer who purchases a package, the numbers of buyers of a package, while important with regard to pricing, is only a *single statistical indicator* of the package not having a particular characteristic that would reduce its value to the seller.⁴⁴

If abstract packages reduce the number of buyers, it is not because they are intrinsically less desirable or effective, but merely because the actions of individual buyers are more specific and information about the number of buyers of some instance of a package becomes less useful. We can choose to give this less importance, and if we start to deal with abstract packages we may well have to do that, in favor of more advanced methods for determining the likely causal effects of a package in a given information product sale. The number of buyers, rate of purchase or something similar might be considered in some abstract way. Conditions might consider this kind of information with regard to all instances of the abstract package together, when pricing an information product in a particular instance.

A more sophisticated approach to pricing conditions might involve examining the numbers of buyers for other instances of packages, but taking account the "closeness" to the package being considered. An abstract package could be considered a set of information products, and this set could be further divided into subsets, each of which is also an abstract package. Each instance of an abstract package would therefore belong to various other abstract packages within that abstract package – groups of packages

⁴³ Note that this would be less of a problem for a package containing a large number of products, as it would be economically less feasible for a buyer to have bought such a large number of products in the absence of the package.

⁴⁴ I mentioned in Section 14.2: Number of Buyers of the Package on Page 3 that the number of buyers may also be relevant as cheaper products would tend to be more rational to purchase for more buyers, so the number of buyers may be used to make some adjustment on this basis, but even in this sense, the number of buyers is still just a statistical indicator.

which have some properties in common. Such an approach may involve examining the numbers of buyers (or similar) that some subset of packages within the abstract package tend to have, to which the package of interest belongs, and then the numbers of buyers for some other subset within the abstract package to which the package of interest also belongs, and so on. This may require sophisticated mathematical techniques. This kind of mathematics, if available, might also be used by conditions that are analyzing conventional packages. Figure 4, below, shows this. In the diagram, *A* represents some package of information packages selected according to the criteria for an abstract package. *B* and *C* represent sets of other packages of products selected according to the criteria of the abstract package – and these subsets are also abstract packages. *A* is a member of both *B* and *C*. A seller’s pricing conditions, when setting the price of a product in *A* may examine sales figures, rates of sale or other information relating to other packages in *B* and *C*.

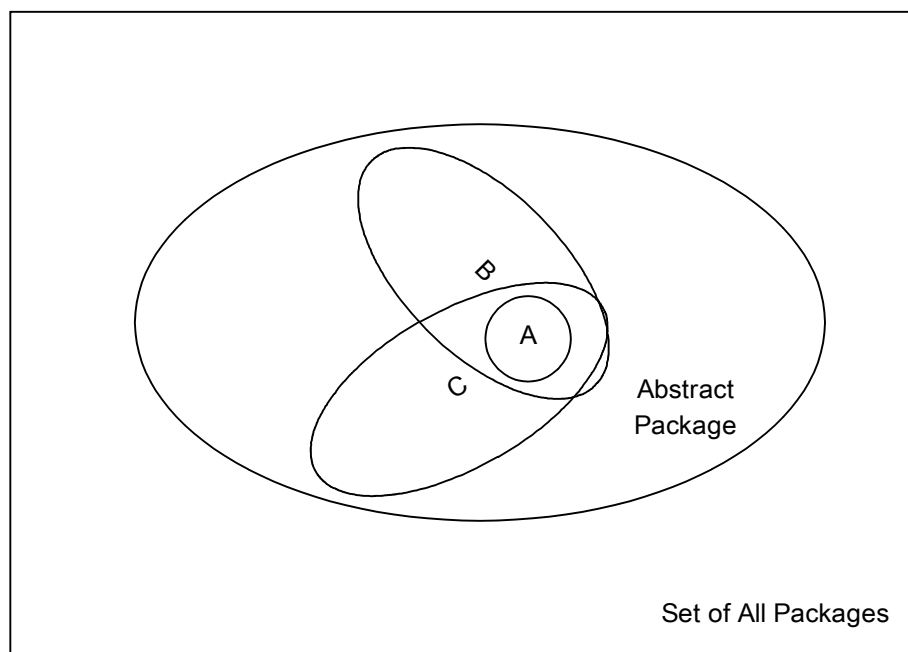


Figure 4: Pricing of an Abstract Package

Some techniques for dealing with pricing conditions for information products in abstract packages could be similar to techniques discussed earlier involving analysis of other packages.⁴⁵

Abstract packages could be implemented by allowing people defining packages to specify lists of products from which selections are to be made. Alternatively, a general purpose computing language might be used to describe an abstract package: A program

⁴⁵ Section 14.7: Other Packages on Page 3.

written in such a language might give a yes/no decision on whether some collection of information products satisfies the rules for the package.

Abstract packages might be useful if there is some sense in which a user may be able to buy varying quantities of a product. For example, a computer program's typical buyers might be businesses who would want to specify the number of copies or user licenses, or a product might entitle a user to access a website for one month, and a user may want three months. If all of these possibilities had to involve separate packages, this would mean that every combination of these possibilities would also involve a separate package and things could become unworkable. Abstract packages would solve this by allowing the user to adapt the package to his/her requirements and have it priced accordingly by the product pricing conditions.⁴⁶ Different instances of the same abstract package, containing different products, might have different prices.

Abstract packages might also have a role to play for products which are adapted to the user in other ways. For example, a particular information product may be sold with a wide range of options, each of which costs money, and the number of options may make it unfeasible to have a separate package for each. An abstract package could deal with this – or the option to adapt the product could be made available at the product level by the seller of the product, the conditions taking account of this.

A detailed discussion of abstracted packages would add little to a discussion of the basic idea, when I am trying to make an argument about how an economy should work, so I will regard it as outside the scope of this article. Abstract packages in some form would probably be needed eventually.

⁴⁶ This issue of products being available in varying quantities will also be mentioned later in Section 20.2: Duplicate Information Products on Page 3.

19 Implicit Packages or a Package-less System

The idea of abstract packages from the previous section might be taken further, in a way that allows us to dispense with *explicitly* defined packages.

In the discussion about pricing conditions for real-world packages, I said that the number of buyers, rate of purchase or something similar would probably be important for a package. However, if it is important it is not important in itself, but merely as a statistical indicator. We would be using it to get an idea, when someone buys the package, of the motivation of the buyer and what he/she would have done in the absence of such a package.

Suppose that our statistical methods were so good that we did not need to be concerned about the number of buyers. Instead, looking at other items of data would give us a good idea of the buyer's motivation. This would make it possible, in principle, for a buyer to define a package of which he/she was the only buyer and still get good discounts on the information products in it. For this to happen, the buyer's selection of products would have to "persuade" the conditions of the sellers of the products in that package that the buyer would probably not have bought all these products without the discount given to items in packages, and that the sellers are therefore getting extra sales. If this were possible, people could define packages and buy them immediately, at a discounted price, without needing anyone else to buy. This would not automatically allow people to have a discount in this way, however. If someone had some specific set of products in mind that he/she would have bought anyway, and the pricing conditions determined that this was likely, he/she would receive no discount at all.

In such a situation, the package itself would be having little effect on what is going on. It would be the buying of a selection of products in one purchasing event that would be causing the price reduction. This suggests the idea of an *implicit package*. An implicit package is some set of products that are not bought as a predefined package, but are instead selected individually by a person. The products in an implicit package are, however, all bought in a single purchasing event. The purchase of such an implicit package can be treated as a conventional package and the pricing conditions can examine the selection of products, and maybe other information, to generate price reductions on the various products in the package.

Implicit packages do not, in principle, need statistical methods that ignore the number of buyers. A buyer might be allowed to select a set of products, without use of a package, and then sellers' pricing conditions might look at how many other people are selecting that same set; however, any need to take account of the number of buyers would limit it, because there are many ways in which people could select different combinations of products, reducing the probability that a number of people will select

the same set. As with abstract packages, this does not mean that reduced numbers of buyers with implicit packages would indicate that they are less effective, but rather that information about the number of buyers would be less useful.

Some consideration of the number of buyers, rate of purchase or something similar might be made in a more abstract way. Instead of considering this for some specific combination of products, pricing conditions might consider this for combinations of products bought by other people that, while different from the combination being considered, share some properties with it; that is to say, combinations of products sharing membership of some formally described group with the combination being considered. This is similar to what was discussed for abstract packages in the previous section. A simple way of doing this may involve considering combinations of products bought by other people that share some of the products of the combination being considered, but more sophisticated methods might be used. A simple way of putting this is to say that the conditions may look at the number of buyers (or similar) for packages similar to the implicit package being considered – with the degree of similarity being taken into account.

There is a connection between this and abstract packages. An implicit package could be considered to be a particular instance of an abstract package with the most general definition possible – one allowing people to select any combination of products and have it priced.

A system like this would be more complex to make than one involving explicit (conventional) packages. If this were possible, explicit packages may still be used. Packages would still be a convenient way to buy many products at once and any statistical approach that worked for implicit packages would work for conventional packages. It may be that both implicit packages and conventional packages are made available, and that the number of buyers, or similar, is treated as more important for conventional packages. It might also be possible for an implicit package to contain conventional packages; that is to say, for a buyer to select a number of packages and buy them in the same purchasing event, without them all being part of a predefined package, while still getting a price reduction.

Implicit packages might also be considered “packages on the fly” – or we might consider implicit packages to mean “a package-less system”.

Implicit packages would be more involved to deal with than conventional packages, and conventional packages are probably better for an initial consideration of this proposal. This is as much consideration as implicit packages will be getting in this article, and for most of the rest of the article, conventional packages will be assumed.

20 Real-World Implementation

20.1 Implementation as a Website

What has been described here would need to be implemented in the real-world in a system which allows sellers and buyers to interact while separated by distance. This suggests use of a website, and for the remainder of this section I will assume a website is being used, although alternatives may be available.⁴⁷ The website would be used by sellers and buyers of information products. Both sellers and buyers would probably need to set up accounts to conduct any commercial activity.

Sellers could place information products for sale on the website and could specify conditions that automatically control the pricing of these products.

Buyers could search for and buy information products. A buyer could also register a commitment to buying an information product if it is offered at or below a specified price.

Any user of the website (a seller or a buyer) would be able to define packages and add information products to them. The person defining the package would not need to have any ownership or control of the information products going into it: Any information product on the website would be available for package inclusion. The person who defined the package, however, would have no control over its pricing⁴⁸. Packages would be treated as information products, meaning that users could search for them, buy them, commit to buying them at some price, or include them in other packages.

The conditions specified by the seller for any particular information product would control the pricing of that product and would take into account any purchases of the product which involve buying the product as part of a package, possibly reducing the price accordingly. The total price of a package would be the sum of the prices of the individual information products in it, set by the sellers' conditions.

Packages could be defined by anyone – sellers or buyers – but the process may sometimes occur without human involvement. Sellers may use algorithms to generate packages which will be in their commercial interests, even though these packages include items being sold by other sellers. The website itself may be able to generate packages automatically that would be expected to generate significant sales.

⁴⁷ Alternatives could be a program running on each buyer's or seller's computer, or whatever may replace websites in the future.

⁴⁸ unless he/she happened to be a seller of one its real information products, in which case he/she would just control the pricing of that particular product.

Any fee charged by the owners of the website (or other system) would be an overhead in distributing information products, and it could therefore make products less close to being pure information products; however a single package could involve the sale of many products and there could be many customers, so economy of scale should mitigate this.

20.2 Duplicate Information Products

It would be useful if the website checked for duplicate information products in packages. This could happen due to packages containing very large numbers of information products and packages being able to contain packages. A user could combine two packages to make a new package, without knowing every product that is in them, and the same information product might be in both packages, causing it to appear twice in the new package. If this occurs, in many situations, it will be best for the website to ensure that the duplicate product only features once, so that packages can be combined into large packages without worrying about this.

There might be situations in which someone *wants* to have a duplicate product in a package – software licenses for multiple users in a business for example, or because each instance of the product entitles the user to access some information service for a month and the package is to provide two months of access. Options other than preventing duplicates should therefore be available. For example, the user may be warned of duplicate products in a package when it is being defined. The user might be able to specify whether or not a package should be allowed to contain duplicate products, and some information products may have extra information, provided by their sellers, that indicates whether or not it would make sense to buy them as duplicate products.

One approach to duplicate information products may be to use abstract packages.⁴⁹

20.3 Standardization

A website like this is not just dealing with pricing of information products, but serves as a central portal for *obtaining* information products. The way the user pays for information products, obtains information products that he/she has bought, or obtains access to those information products would ideally be standardized as much as possible. Ideally the buyer of a package would make a single payment through this website, which would then distribute the money to the sellers of the different, real information products in the package. The way in which users download purchased information products would ideally be the same each time. This may mean that the website itself would store information products uploaded by sellers, and make them available for download, or it may just mean that the website makes a link available to the seller's

⁴⁹ This was discussed previously in Section 18: Abstract Packages on Page 3.

own website for each information product purchased. If the user has subscriptions to various information products, or registration keys, licenses, etc. then these should be accessible through the user's account on such a website. If digital rights management (DRM) is used then it should be dealt with in a standardized way. These are issues which would be considered anyway for any website involving the sale of information products, but they are more important here because some buyers may make single transactions involving large numbers of information products: For a system like this to be viable, the buyer needs to be able to do this without having to do a lot of administration work him/herself to obtain access to what he/she has bought, or to retain access to it (for example when replacing computers).

20.4 Dealing with Pricing Deadlock

One concern may be pricing deadlock – if sellers specify conditions that refer to each other's prices – however I have already given examples of how this could be resolved, one such method involving the website experimentally reducing prices for multiple information products in a package, non-publicly, to see if conditions for lower pricing can be met.⁵⁰

20.5 Pricing Conditions

Conditions to set prices might be defined in a variety of ways. They may be simple, maybe being made by selecting from dropdown lists or checking boxes, or they may be more complex, involving something that looks a bit like a database query. Conditions could be expressed in still more sophisticated ways as scripts which are executed like computer programs, which process a lot of information from many different sources to set a product's price. Some users may want the flexibility of expressing pricing conditions in a general computing language.⁵¹ Others may find this too complex and may want a simpler way of expressing conditions.

Ideally, users wishing to deal with conditions at different levels of complexity would be accommodated. One way of doing this could involve defining a general purpose computing language for expressing conditions, and making this language available to users, but also providing systems that provide user interfaces that interact with other users in less complex ways and generate the code in the general purpose language automatically, so that the user of such an interface does not have to understand how any of the code works. In addition, users may be able to construct various modules and code generation tools, which could enter the market as information products.

⁵⁰ Section 14.4: Actions of Other Sellers on Page 3.

⁵¹ That is to say, a language providing Turing equivalency.

The website or other system providing all this may provide various built-in tools to extract data and generate various statistical results with minimal effort by the person specifying the conditions.

20.6 Payment Processing

It may seem that a system like this would need to process impractically large volumes of small payments, because when a buyer purchases a package, the buyer makes a payment and the sellers all get their shares. If a package contained 100 products, and payments were processed individually like this, the sale of a package to a single buyer would involve 101 transfers of funds (one for the payment from the buyer and 100 for transfer to each of the sellers). This is unnecessary, however. When a package is bought, the payment due to each seller could be placed in an internal account and funds could be transferred from these internal accounts to sellers at suitable intervals, so that each transfer to a seller covers a number of information product sales.⁵² This helps to bring information products closer to being *pure* information products by reducing an overhead involved in selling them.⁵³

20.7 Extra Features

A website like this may have other features, such as the facility for users to review or rate information products and information packages or to exchange messages, that do not directly relate to the proposal here, but which would generally enhance the user experience of the system. Some of these features could conceivably play a part in package pricing. For example, if users can give scores to information products on the site, the conditions for information products may examine this information, or if users can write reviews on products, the conditions may examine these reviews for keywords, or for the names of other products, etc. If *all* the data in the system is available to conditions, there could be issues about privacy and consideration would need to be given to how far to go with things like this. Buyers might be sent e-mails, telling them about packages that might interest them, based on previous purchasing or searching history. This would be a bit like the current practice of Amazon.com, an online retailer of books and other products, of sending customers e-mails about products that may interest them.⁵⁴

⁵² Alternatively, funds could be transferred to a seller when the account balance reaches a certain value, or when the seller requests the transfer.

⁵³ The way that selling products in groups increases the efficiency of payment processing is mentioned in the Bakos and Brynjolfsson article.

⁵⁴ <http://www.amazon.com>

20.8 General Discussion

Pricing conditions are an important feature of the proposal, and it is in the sellers' interests to get them right. If the pricing conditions give an insufficient discount when taking account of some package, extra sales that may have been generated by the package are lost, costing the seller money. If the discount is too large then extra sales of the package may occur, but the price will have been reduced to such an extent that it is not worth having these extra sales. Because of the importance of this, some sellers may go to considerable trouble to develop appropriate conditions. There could be a market for sophisticated pricing conditions, for writing bespoke conditions, or for modules and code generation tools to make them easier to produce.

Whether humans or computer programs would be better at creating packages remains to be seen. Whatever the case, automatically generated packages are likely to be common because they can be so easily generated. It is possible that there may be a large number of automatically generated packages and a small number of more effective, human generated ones. It is also possible that humans would find it hard to compete with computer programs. This would not remove the human element entirely of course: It would just mean that the human input is in writing the package generation software. At this stage I am not taking a position on which is more likely.

The sort of website proposed here could be set up privately and does not require any enabling legislation or overall state control to make it work. It is possible that something like this could be set up by one or more of the sellers of information products themselves: They may think it makes sense to be owners *and* users.

I have been discussing this as if there is a single website, but there does not have to be just one. Multiple websites like this could be set up, each trying to persuade sellers and buyers to use it. However, the first such website would have a considerable advantage in gaining a user base before the others. In reality, if the proposal described here were put in operation on one website, it may be difficult for competitors to establish themselves. An analogy is online auctions: It would be difficult for anyone to compete with eBay on a large scale as everyone is already using eBay.

If a number of competing sites like this did exist, there could be some motive for standardizing aspects of how data is presented to them. For example, conditions for setting the prices of information products could be expressed in a standard way. On the other hand, whoever was first into the market may just think it better to persuade people to use their system almost exclusively.

Setting up a system like this would be complex, but it would not need doing all at once. For example, the initial version might provide less sophistication in describing conditions than would be available later. It would be important that the design of such a system

was mathematically and economically sound, and consultation with mathematicians and/or economists may be advisable in the early stages.

I have discussed the proposal in terms of packages containing products from different sellers, but a package could contain products from just one seller. A single seller might consider setting up a system to deal with different sellers, but a single seller could also set up a system like this so that they would be the only seller on it. This would be most attractive to a seller with a large catalog of information products, as it would mitigate the obvious problem with such an approach – that it reduces the number of available products. We should be careful about how we view such a “single-seller” system. Such a seller may be obtaining the information products that they are selling from many different sellers, with each seller being given a payment for each copy sold – and such sellers would need dealing with in such a situation, meaning that this could be a multiple-sellers situation in all but name.

Abstract and implicit packages could also play a role, but these would need a more sophisticated system, and it is the *idea* that I am discussing here.

Alternative methods of implementing a real-world system are described in Appendix 2.⁵⁵

⁵⁵ Page 3.

21 Is intellectual property theft a problem?

One objection to the proposal could be based on theft of copyright and other forms of IP. If all these information products are available digitally, could we not get a situation in which many people are making copies without paying?

This is not really my problem. I am not advocating the sale of information products. The sale of information products is already happening, and will happen more in the future regardless of whether anyone does what is being proposed here: Sellers will have to deal with the issue of copyright theft anyway. Any discussion about this is just the usual discussion about copyright theft, though it may have more relevance here simply because what I propose is likely to promote the transition to an information economy even more quickly, and will also cause more copies of information products to be around. Various measures may be tried, such as DRM, which is controversial as some buyers object to it. I am going to stay neutral on using such measures to prevent copyright theft, because they are not relevant to my main proposal. For example, if I proposed DRM to prevent copyright theft, someone may disagree with me, but this would have nothing to do with whether the main proposal described here makes economic sense. I am not even going to get into the issue of whether it is ethical to treat information as property, whether copyright should exist, etc. All this is beyond the scope of what I am proposing.

I acknowledge, though, that in the earlier discussion about transfer of products between people, I have said that transfers of products which break up packages would cause problems, and that limitations on this may be needed. Any such limitations would almost certainly be aimed at preventing theft of IP as well.

If anything like DRM is used it should be standardized as much as possible. For example, if people are going onto a website to buy information products and packages, it would be desirable for DRM, where applied, to be dealt with in a standardized way.

There is one way in which the proposal may *help* with theft of IP. Some IP theft may occur because people cannot otherwise afford to own what they want. By reducing information scarcity, and causing more efficient distribution of information products, the proposal may remove *some* of the tendency towards IP theft. It would be naïve to think it would remove all of it.

One way of dealing with IP theft which I will mention is *advance selling*. I said earlier that this is not a major part of this proposal, but I am mentioning it now because it would be particularly compatible with the kinds of systems being proposed.

22 Advance Selling

22.1 The Idea of Advance Selling

Advance selling is less important than other features of the proposal. The idea is that an information product can be sold before it is available, and maybe before it is even made. People could commit to buying the item, possibly at different prices. For anyone to be able to buy the product at a given price there would have to be some minimum number of committed buyers at that price.

If enough people commit to buying at some price, so that transactions occur involving the information product, then it is understood that the seller has an undertaking to provide the information product at some later date. The seller could be prevented from actually receiving any money until the product is available. Advance selling could take two forms:

- The item is offered for sale, and transactions can occur before the information product is available, even if the money is withheld from the seller: For all practical purposes, the information product has been bought.
- The item is offered for sale, but no transactions can occur for a given combination of price and required number of buyers until the information product is actually available.

These two options are similar. The main difference is that with the first option, commitment can be made irreversible before the product is ready, meaning that the seller can safely allocate resources to making it, knowing that there are guaranteed sales, while with the second option, many people could commit to buying and could then pull out before the product is launched, leaving the seller with no buyers after spending resources on producing the product. With the first option the seller would have a responsibility to produce and supply the product, and the sales may be undone if this does not happen, but this still represents some risk for buyers because the product may be of a poor quality. The second option, on the other hand, involves more risk for the seller, but at least allows him/her to get *some* likelihood of success for his/her product. Buyers are likely to find the first option more acceptable for established creators of information products, or ones for which some third party has made some guarantee: Novice creators could find it difficult to get away with this.

22.2 Advance Selling and Intellectual Property Theft

Advance selling could help with theft of IP (for example, copyright theft) by allowing a seller to guarantee a certain level of sales before the product is put on the market. By definition, any such sales are not going to be affected by theft of IP that occurs after the product goes onto the market.

A variation on the first kind of approach discussed above might be one in which transactions occur, but these are subject to the finished information product passing one or more quality tests, specified by the seller in advance. For example, the seller might designate a number of critics who give ratings to information products and say that these critics must award certain minimum ratings if they review the product. The seller might list a large number of publications in which information products are rated and somehow relate the price that people will end up paying to the average rating, so that buyers know that the seller is still motivated to produce a good product. This kind of arrangement would leave the seller vulnerable to the possibility of the product failing such quality tests, but would still protect the seller from theft of IP destroying the market for his/her product before any sales could be made.

23 *Impure* Information Products

The assumption has been that we are working with pure information products – ones with no cost to manufacture or distribute beyond the cost of producing the first copy. This will never be completely achieved. Even a product sold as an Internet download will have costs incurred due to bandwidth usage in downloading and processing payment. Information products can already be distributed today with a cost per unit much lower, in comparison with the cost of creating the first copy of the product, than it is for pre-information age products, and they will get closer to being *pure* information products in the future. The fact that information products are not pure ones does not invalidate this proposal: Sellers would need to take account of that in their pricing conditions.

Almost any product would actually have some of the characteristics of an information product – if only minimally. For example, when a new model of car is being made, the first one, the prototype, will cost a lot to make because of all the development work that has to go into it. Once production is underway, cars will be much cheaper to produce.⁵⁶ Although they will be nowhere close to being pure information products, as the cost of each car is still high, they will still have a bit of the behavior of information products.

This means that, in principle, we might imagine using the proposal described here for products which are some way from being information products, because of the small amount of “information product nature” that they have. Any price reductions which such products would have by being in packages would be much less than they would be for things like downloaded products. Whether it would be practical to do this is another matter. I find it hard to imagine this being worth doing with cars really, and I do not think I would be taken very seriously if I suggested that, but there may be some “physical” products for which it does make sense.⁵⁷ Ultimately, if the kind of system in the proposal were established, the market would decide which kinds of products it was worth marketing with it. I am just pointing out that there is no obvious cutoff point.

The basic *paradigm* of this proposal may be applicable in areas where much of a product’s value is in IP, such as patents, and where inefficiency of information distribution could limit people’s access to certain products. This might be relevant to areas such as pharmaceuticals and biotechnology.

⁵⁶ Of course, even after the prototype has been made, a large investment will be required in setting up a production line, meaning that the first cars to come off the production line will represent a large investment.

⁵⁷ As before, this is an informal use of the word “physical” and we will not be debating metaphysics here.

24 The Central Committee Scenario Revisited

Previously, the central committee scenario was given as an example of a way that efficiency of information product distribution could be attained.⁵⁸ I stated that it was not a serious suggestion, but rather was to show that information distribution is currently inefficient.

There is a way, however, in which this scenario might be taken a bit more seriously. It actually gives a reasonable analogy for packages.

A package could be considered as a microcosm of the central committee scenario – as a reduced-scale world in which such a central committee exists. All the products available in this miniature world are just the ones in the package, and nothing else exists. The role of the central committee which gives money to sellers is taken by the seller's themselves. Each seller indicates what he/she wants to be paid for his/her information product and the demands of all the sellers become the central committee's decisions. In the central committee scenario everyone gets a copy of everything. That is what happens in this microcosm.

When someone decides to buy the package he/she is deciding to become part of the population of the self-contained world in which the package and its "central committee" – that is to say, its sellers – run things. From the point of view of people involved with the package, everyone else may as well not exist. Everyone in this microcosm – everyone who agreed to buy the package – receives every information product that there is – that is to say, all the information products in the package – and this is funded by the money that everyone has to pay to be a buyer of the package – which might be considered a quasi-tax levied against anyone who chooses to join the package's self-contained world. If people commit to buying the package at various prices this could be considered in much the same way, except that we may continue each person joining a kind of microcosm populated by other people who committed to buying at the same price.

This means that one way of viewing the proposal in this document is as a way of making the central committee approach work – by establishing microcosms with viable mechanisms for determining how much dealers are paid.

This is only an analogy and the proposal in this article can be understood without it.

⁵⁸ Section 4.3: The Central Committee Scenario on Page 3.

25 Conclusion

Information products have the potential to be copied in huge amounts, leading to an *information-rich society*. This, however, does not happen. The free market tends to cause scarcity of information products, the scarcity depending on what people are prepared to pay. This arises from the need of sellers to make money and causes inefficient distribution of information and *information poverty*.

We should be able to see that distribution of information is inefficient if we consider ways in which the situation could be resolved, even if these are far-fetched. One way would be to have all information products made available to everyone and to have a central committee which would decide how much money should be paid to producers of the information products, the idea being that they would be paid the same amount that they would have received conventionally. Another way would be to use a mind-reading machine which detects whether a potential buyer is prepared to pay for an information product: If so, the buyer has to pay for it, but otherwise receives it free of charge. Approaches like this are impractical, and are not seriously proposed here, but that is not the point: In principle they provide more efficient information distribution than the current system, indicating that the current system is inefficient at distributing information.

The proposed way of dealing with information scarcity is to abstract an agreement between buyers. This involves selling products in groups, an economic idea that has already been explored. If there are two buyers, each of which wants a different product, each buyer could agree to help the other by buying the other buyer's *preferred product*. Each buyer has therefore gained the seller of his/her preferred product an extra sale. The sellers of each of the two products could be persuaded to reduce their prices for these two buyers if such an agreement is in place, to take advantage of the agreement and get more sales. The result is that each buyer could purchase both products for potentially not much more than the cost of a single product. This can also be considered as an agreement between the sellers of the two different products to reduce prices for people buying both products, so that someone who buys one of the products is likely to buy the other.

If such agreements had to be explicitly made, the system would be too unwieldy. Instead, these agreements are abstracted as *packages*. A package is a collection of information products that is an information product in its own right. A package can be bought like any other information product, and packages can be placed in other packages. Buyers can buy the package, or commit to buying it, and *conditional pricing* allows sellers to use conditions to set the prices of their information products when bought as part of a package. As a package is an abstraction of the kinds of agreements just discussed, in general, sellers would discount the prices of information products bought in packages. A system like this could be implemented on a website, with both

buyers and sellers being able to define packages and sellers specifying the conditions for information product pricing, which would take account of packages.

It would be to the advantage of sellers to have conditions which set prices of information products accurately, taking account of packages. Any package could be considered to be somewhere on the spectrum between an ideal package and an anti-ideal package. An ideal package would be one for which each buyer has just a single preferred product which he/she would have otherwise bought. An anti-ideal package is one for which each buyer would have bought all the information products in the package anyway. A seller will want to give larger discounts for packages which are close to being ideal, and for those which will tend to be bought by buyers whose preferred information products in the package are *someone else's*. To do this, sellers may take account of various items of information, including the number of products in the package, the number of buyers of the package or the rate at which people are buying it (Although this is not relevant in simplified consideration of packages, it is likely to matter in real-world situations.), the relative sales figures of the sellers' information product and those of other sellers in the same package, the actions of sellers of other products in the package with regard to pricing and various items of information that might be obtained through search engines. This is not an exhaustive list.

Measures may need to be taken to prevent packages being broken up by transfer of selected products from those packages from the buyer to someone else. This is not necessarily about theft of copyright and other forms of IP, but is a separate issue.

An additional approach that could be used is *advance selling*. This would involve buyers being able to buy or commit to buying an information product (and there is little distinction between these in this case) before it has even been made. Advance selling could help to reduce the impact of IP theft on sellers.

Abstract and implicit packages might be used. An abstract package is a type of package for which the definition just specifies criteria with which the products in the package must comply, and a buyer could select the products that he/she wanted, provided they complied with these criteria. An implicit package would take this further still and remove the need for packages to be defined explicitly; however, if such a system were possible, it is likely that conventional packages would still be used.

The proposal has mainly assumed pure information products – ones for which the costs of manufacture and distribution are independent of the number of people receiving the product. In reality, no product will be a pure information product, but modern computing and network technologies mean that some products will become increasingly close. Most products will have some information product characteristics, in that there will be some economy of scale for supplying them to many people, so it is possible that the proposal could be used for some of what are generally thought of as “physical” products. The market would decide all this.

It may seem that all this is about trying to get more music, romance novels or crime thrillers for people, but there is more to it than this. As technology advances, information products will become more prominent in the economy. In the future, much of society's wealth will be tied up in 1s and 0s rather than in stocks of natural resources or warehouses full of physical items. An extreme example of how a society could transition to one in which information is the primary product is provided by K. Eric Drexler, director of *The Foresight Institute*.⁵⁹ Drexler has proposed *molecular nanotechnology* – technology which would work at a small scale for accurate control of matter.^{60,61,62} Molecular nanotechnology, if Drexler's vision becomes reality, would involve *digital matter processing* – the capability of treating matter in the same way that we treat information today.⁶³ Items now produced expensively in factories would be built easily and cheaply by small machines, controlled by computer programs. Once an object had been designed, and the computer instructions to make it have been prepared, huge numbers of copies could be made from raw materials for almost nothing. In such a world, if you had the information about how to build a thing you could have the thing itself and information would be the main commodity. Society's wealth would depend on efficiency of information distribution. In such a future, or other futures we might imagine in which the economic role of information is increased, an *information-rich society* is a *rich society*. Closer to today, there are already ways in which society is information-poor in ways that harm it. As just one example, educational institutions have limited resources to spend on computer software for the use of students, yet in an information-rich society the scarcity of such software would be reduced. We might also speculate about the market for products generated from IP in areas such as pharmaceuticals and biotechnology and ask if the paradigm in this proposal could be beneficial.

What is being proposed here is an attempt to make the free market more powerful by abstracting interaction between people in it. Such abstraction has occurred before. Money is a way of abstracting agreements between people about the exchange of items. The world stock market is a further abstraction. This proposal is no more a criticism of the free market than proposals for money or stock markets would be.

This proposal requires no enabling legislation and could be pursued as business rather than a political cause.

⁵⁹ <http://www.foresight.org>

⁶⁰ Drexler, K. E. (1986). *Engines of Creation: the Coming Era of Nanotechnology*. New York: Anchor Books.

⁶¹ Drexler, K. E. (1992). *Nanosystems*. New York: John Wiley and Sons Inc.

⁶² Drexler, K. E., Peterson, C., Pergamit, G. (2000). *Unbounding the Future: the Nanotechnology Revolution*. New York: William Morrow.

⁶³ In the interests of balance, I should point out that molecular nanotechnology is controversial and there is criticism of Drexler's views. For example: Smalley, R. E. (2001). Of chemistry, love and nanobots. *Scientific American* 285 (September 2001). pp76-77. Molecular nanotechnology advocates do have answers to such criticisms, but I will not attempt to reference the entire, ongoing debate here.

26 Appendix 1: Special Case of a Package with a Single Buyer

The main text describes a package as representing an agreement between ideal buyers, each of which prefers a single information product, to help each other by buying each other's preferred information products.⁶⁴ This is a simplification: Each buyer need not have a single preferred product. If we consider things in this "agreement" way, you may ask what happens when a package only has one buyer. If a package is an abstraction of an agreement between buyers, does this not cause a problem? A package with a single buyer would be of little commercial interest. Sellers would probably give greater discounts for packages with more buyers and a package with just one buyer would probably not have any discount at all in the real world. However, we will ignore that and consider this situation, because it can give us a good understanding of how *abstract* packages are.

The special case causes no problems. A package is an *abstraction* of an agreement, and the amount of abstraction is very high. Let us consider this in the context of the package of two novels, the Sherlock Holmes novel and the Hercule Poirot novel, from the main text. We will ignore the fact that greater numbers of buyers would tend to favor a package and consider this in a more idealized way.

Suppose the Sherlock Holmes and Hercule Poirot package is defined and after a long time just one ideal buyer wants the package. Let us imagine that this buyer has a single preferred product – either the Sherlock Holmes novel or the Hercule Poirot novel – but we do not know which it is. From the point of view of each seller, there is a chance that the preferred product is the other seller's, and that therefore the seller has gained a sale as a result of the package. This "chance" is really equivalent to a *proportion*. It only looks different because there is a single buyer. When we analyzed the idea of packages, we considered how much sellers could reduce prices, and that consideration assumed that a certain *proportion* of buyers would have each product as their preferred product and the discount that could be applied was arranged accordingly. This reasoning can still be applied for a single buyer because it is statistical. A seller can offer a discount, even when there is a single buyer, knowing that there is a chance that the package has caused the sale of this seller's information product. Sometimes the seller would be wrong on this, but in other situations with a single buyer the seller would be right. As the discount would already have been calculated anyway so as to take account of the fact that only a proportion of sales of any single information product would have been caused by the package, all this has already been taken care of so that the seller should make money in the long run with different packages.

⁶⁴ Section 10: The Rationale Behind Packages on Page 3.

Some readers may be dissatisfied with this, saying that the idea is based on an agreement between buyers, and that the other buyer must be *somewhere* for this even to make sense. One answer to this is that the other buyer could be in the *future*: The person buying the package now could be making an agreement with some unknown person, at some unknown time in the future, to work together to get a reduced price. Some people would be dissatisfied with this though, and say that a package might only *ever* have a single buyer, in which case, how is any agreement being abstracted?

The answer to this is that packages are not just abstractions of agreements between buyers to work together to buy products more cheaply, but are also abstractions of agreements between *sellers* to work together to make extra sales.⁶⁵ Such an agreement can be made without any buyers actually being present.

Let us consider this in the context of the Sherlock Holmes and Hercule Poirot package. The seller of the Sherlock Holmes novel agrees to decrease his/her price to persuade people to buy the package of two novels. Assuming that the buyer has a single preferred product, this will either help to persuade someone who intends to buy the Sherlock Holmes novel to buy the Hercule Poirot as well or it will help to persuade someone who intends to buy the Hercule Poirot novel to buy the Sherlock Holmes novel as well. The seller of the Hercule Poirot novel does likewise.

Each seller, therefore, when reducing the price of his/her information product for a single person who wants to buy the package, is doing it either to meet his/her responsibilities under the agreement with the other seller or to profit from the agreement with the other seller. Which it is depends on the motives of the particular buyer at the time.

In a real-world situation, when a single buyer for the package appears, the sellers are unlikely to know the buyer's motive, but this does not matter. Regardless of the buyer's motive, one seller will be offering a discount as part of the agreement to help the other seller and the other seller will be offering a discount to profit from the agreement. On any single purchase, a seller may profit or lose out (by offering an unnecessary discount), but if the seller sets prices properly he/she should gain over any statistically significant number of transactions.

If a package only ever had one buyer, the same would apply. One seller would benefit from the agreement and the other would lose out from it. It is unlikely that either seller would ever know who had gained and who had lost. This does not matter though, because sensible pricing will mean that over a large number of transactions involving this and other packages, both sellers will profit from agreements like this. The agreement exists between both sellers to exploit a *potential* agreement between the buyers.

⁶⁵ This is shown by Figure 1 on Page 3.

27 Appendix 2: Alternative Implementations

A website like the one proposed⁶⁶ would involve sellers and buyers placing information on it, but the website might interact with external systems used to store some of the data that it uses. For example, sellers could place all their information on the site, or some of it may be held in external databases connected to the website. The conditions for setting prices may be executed on the website, but they could also conceivably be executed on the seller's own computers, with the resulting price being passed to the website – though this may present issues of reliability of connection and timing.

I have said that someone defining a package would be able to add any information products to that package, but a facility might exist to allow sellers to prevent their products being added to certain packages. The reasons for this are unlikely to be economic, as sellers can use conditional pricing to deal with that anyway, but could be related to public image: They may not want their products associated with various, other products. A seller should have a good reason for this, however, as it is limiting the seller's trade, and I am not sure that such a facility would be needed.

An alternative to a website might be some kind of distributed system, in which sellers make information product details available on their own websites, where scripts run to implement conditions, and anyone can make a package, and host it anywhere, which accesses these details and the seller's conditions. A variation on this could involve the seller's conditions being made available as a downloadable program, possibly in some format that makes it hard to reverse-engineer, so that someone wanting to use the seller's product in a package could copy the conditions to their own website. This would involve determining standards to be followed and making various scripts available. It would be more complex than just implementing this on a website.

The implementation could also be simpler than what has been described in the proposal. Instead of pricing conditions being used, and prices being set by computer software, sellers could set the prices of their products themselves for particular packages. Such simplicity would come at a cost: This would only be practical with small numbers of packages. Such an approach, however, may be used in some situations where a small number of relatively important packages are involved.

⁶⁶ Section 20: Real-World Implementation on Page 3.

28 Bibliography

Almond, P. (2006). *Funding of Ambitious Projects*. Retrieved 30 April 2005 from <http://www.paul-almond.com/FundingOfAmbitiousProjects.pdf>.

Bakos, Y., Brynjolfsson, E. (1999). Bundling Information Goods: Pricing, Profits and Efficiency. *Management Science* 45 No. 12 pp1613-1630.

Bakos, Y., Brynjolfsson, E. (1999). *Bundling Information Goods: Pricing, Profits and Efficiency*. (An online version of the article in the previous reference.) Retrieved 27 January 2010 from <http://pages.stern.nyu.edu/~bakos/big.pdf>.

Drexler, K. E. (1986). *Engines of Creation: The Coming Era of Nanotechnology*. New York: Anchor Books.

Drexler, K. E. (1992). *Nanosystems*. New York: John Wiley and Sons Inc.

Drexler, K. E., Peterson, C., Pergamit, G. (2000). *Unbounding the Future: the Nanotechnology Revolution*. New York: William Morrow.

Smalley, R. E. (2001). Of chemistry, love and nanobots. *Scientific American* 285 (September 2001). pp76-77.

Stallman, R. M. (2002). *Free Software Free Society: selected essays of Richard M. Stallman*. Boston: GNU Press.

Ibid. Chapter 18: Why Software Should Be Free, p121.

Stallman, R. M. (2002). *Free Software Free Society: selected essays of Richard M. Stallman. GNU Operating System*. (An online version of the book in the previous reference.) Retrieved 17 August 2009 from <http://shop.fsf.org/product/free-software-free-society>.