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## **Unveiling ‘Invisible Hands’: Competition in Two-Sided Health Care Markets**

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## **Abstract**

Drawing upon the principles of markets with two-sided platforms, this paper develops a taxonomy for thinking about institutional design and the application of competition principles in health care markets. The taxonomy separates out the effect of a subsidy for the delivery of health care from the markets for provision of health care. By conceptualising the subsidy as one of the products of a two-sided subsidy or insurance platform, it becomes evident that the justification for different approaches to the application of competitive standards applies to the upstream subsidy platform rather than the downstream health care delivery market. Whilst insurance markets are more complex two-sided platforms than simple subsidies, due to multiple externalities being shared between risk management seekers and benefit seekers who may be the same individual, the principles of analysis are the same. Profits and/or welfare will be maximised only when externalities related to the insurance or subsidy are shared optimally across the subsidy platform. Distortions in downstream markets do not lead to increased welfare, irrespective of whether the subsidy is applied as a benefit subsidy or a premium subsidy. Rather, such distortions militate against the incentives for platform operators to optimise the allocation of the costs and benefits of externalities via premiums, benefits, patient co-payments and donor opportunity costs.

## **Competition and Health Care**

A long-held tenet amongst many health economists is that, as a consequence of the market imperfections arising from uncertainty and information asymmetries between buyers and sellers, health care markets differ so significantly from hypothetical ‘perfect competition’ that competition and antitrust laws “possibly should not be enforced in health care markets, or enforced differently in health care markets than in other markets” (Gaynor and Vogt, 2000:1409). Indeed, a common claim is that health care markets are so fundamentally different from other markets that meaningful competition is either impossible or counter-productive (Crew, 1969; Robinson and Luft, 1985; Lynk, 1995).

The suggestion that competition in health care is counter-productive is generally attributed to the presence of treatment subsidies (from either insurance benefits or taxation-funded government subsidies) leading to excessive consumption, whereby subsidised individuals consume medical services past the point at which the marginal utility of an additional service is equal to its marginal cost (Arrow, 1963; Pauly, 1968). Intuitively, it seems that imperfect competition in the medical care market, resulting in prices above marginal cost, may constrain patients’ over-consumption (moral hazard) behaviour (Crew, 1969). This intuition, which has become a kind of ‘folk theorem’ in health economics (Frech, 1996; Pauly, 1998; Folland, Goodman and Stano, 2001), derives from the theory of the second-best, whereby a second distortion may improve performance in a market already immutably distorted (Gaynor, Haas-Wilson and Vogt, 2001). A consequence of this thinking is extensive government regulation and production of health care, and a general hostility towards the application of the principles of competition and antitrust laws to health care markets (Gaynor and Vogt, 2000).

Certainly, imperfections exist in health care markets. However, Gaynor and Vogt (2000) contend that few real-world markets satisfy ‘perfect’ textbook requirements, and that in many markets the deviations from perfect competition are substantial. They suggest that all markets should be considered individually: “while competition in health care markets should be examined in light of its special character, so should competition in any market” (p1409). If many other markets exhibit characteristics similar to those of health care markets, then the design and application of competition, regulation and antitrust law in all markets may benefit from greater understandings about the deviations from perfect competition in each of them.

To this end, this paper examines the applicability to health care markets of the principles underpinning an emerging category of markets, generally known as ‘two-sided markets’ or ‘markets with two-sided platforms’, where, amongst other challenges to traditional thinking

about competition, it is found that welfare is maximised at prices other than marginal cost (Rochet and Tirole, 2002; 2003; 2004; 2005; Caillaud and Jullien, 2003; Wright, 2004; Evans and Schmalensee, 2005; Parker and Van Alstyne, 2005; Eisenmann, Parker and Van Alstyne, 2006; Bardey and Rochet, 2006, amongst others). Section 1 discusses the theories of ‘two-sided markets’, including the defining characteristic ‘platform’ via which two groups interact in ways that, absent the platform, would be impossible or less efficient.

Section 2 then applies the principles of two-sided markets to health care. This section develops a taxonomy of health care markets, with an upstream two-sided subsidy platform and a downstream health care delivery market. The subsidy platform is then extended to become a two-sided insurance hub, linking buyers of risk management with those falling ill and demanding subsidies with which to pay for care. The internalising of the over-consumption externality by participants in the two-sided platform removes it from consideration as a factor in the downstream market. There is now no moral hazard-related justification for the application of a standard other than perfect competition in the markets for the provision of health care services.

The finding that all insurance markets are two-sided begs the question whether there is still any justification for a different competition standard in health care provision markets than in markets for other subsidised or insurance-funded goods (e.g. vehicle crash repairs). Section two concludes with the finding that whilst premium subsidies add a level of complexity to the insurance platform not present in the markets for other insurance-funded goods, as with the moral hazard externality from treatment subsidies, the externality should optimally be shared between the parties whose activities create it, rather than resolving its consequences in downstream markets. Indeed, relying upon the downstream markets to resolve the consequences creates additional distortions, as it removes incentives for the operators of the insurance platform to seek to improve the efficiency of the upstream market as well. Section 3 concludes with some research ideas and policy implications that emerge from viewing health care markets as two-sided platforms.

## **1. *Markets with ‘Two-Sided Platforms’***

A significant recent development in competition and antitrust economics has been the identification of a class of market structures where, due to economic characteristics of the products and production technologies employed, it is less than clear that standard economic assumptions about competition, and in particular the wisdom of imposing instruments endeavouring to push all prices closer to marginal cost, will lead to increases in welfare.

These markets include, to name but a few, academic journals, airports, B2B markets, car fairs, flea markets, shopping malls, trading posts, debit and credit card payment schemes, directory services, employment agencies, video game platforms, computer operating systems, expos and trade fairs, magazines, newspapers, public TV operators, web portals, quality assurance providers, real estate agencies, search engines, telecommunications networks and stock markets (Wright, 2004).

### **1.1 Characteristics of Two-Sided Markets**

The single characteristic linking these ‘special’ markets is that they have at least two distinct sets of users, each of which obtains value from interacting with users of the opposite type over a common platform. For example, market trading platforms link buyers and sellers, newspapers and television link consumers and advertisers, and debit and credit card platforms link merchants and card-holders. In these markets, platforms cater to both types of users in a way that allows them to influence the extent to which cross-user externalities are internalised (Wright, 2004). Sometimes, there are more than two parties involved: for example, software platforms, such as Windows, link at least three user groups – hardware manufacturers, application developers and end users (Eisenmann, Parker and Van Alstyne, 2006). The sources of the externalities present in such markets are predominantly network effects, scale economies and transaction costs, the negative effects of which can be ameliorated by the creation of an intermediary – the ‘platform’ – via which the parties interact.

Markets exhibiting such characteristics have become known generally as ‘two-sided markets’ (Rochet and Tirole, 2002; 2003; 2004) or ‘markets with two-sided platforms’ (2SPs - Evans and Schmalansee, 2005). Building on Rochet and Tirole (2004), Evans and Schmalansee (2005:6) suggest that “generally one can think of 2SPs as arising in situations in which there are externalities and in which transaction costs, broadly considered, prevent the two sides from solving this externality directly. The platform can be thought of as providing a technology for solving the externality in a way that minimises transaction costs”.

Most commonly, 2SPs arise as a consequence of specific externalities. One common factor is the presence of network externalities – that is, where one user’s value from a network is increased by another user’s participation (Katz and Shapiro, 1985, 1986; Farrell and Saloner, 1985, 1986). Marketplaces fall into this category, as the more buyers there are, the more sellers are attracted, and consequently the more buyers who will participate, in a classic ‘chicken and egg’ manner (Caillaud and Jullien, 2003). They can also occur in multi-product markets where externalities arise in the consumption of two or more different products in a

manner that is not addressed by the standard multi-product pricing literature (Rochet and Tirole, 2005). These externalities result in effects where the number of consumers of one product affects the desirability of another product for a different set of consumers, such as occurs with gaming consoles and the games played on them (Parker and Van Alstyne, 2005). A further class of 2SPs can also arise when there are multiple violations of the conditions required to satisfy the Coase theorem, resulting in circumstances where “the seller cannot pass the increase in his cost of interacting with the buyer through to the buyer” or where “transaction costs may hinder this pass-through” (Rochet and Tirole, 2005:10). The presence of a platform intermediating between the buyers and sellers allows this externality to be resolved.

## **1.2 Two-Sided versus One-Sided Markets**

How, then, are two-sided markets identified? As Rochet and Tirole (2005:2) state, “pretty much any market would be two-sided, since buyers and sellers need to be brought together for markets to exist and the gains from trade to be realized”. Their key criterion for two-sidedness is that “the volume of transactions between end-users depends on the structure and not only on the overall level of fees charged by the platform”. This leads to a distinction between different end-users’ ‘membership’ of a platform and transactions (which may be implicit or explicit) between the end-users that generate ‘usage’ of the platform. The ways in which the platform operator structures the prices charged to each side for membership and usage affects the willingness of each side to trade on the platform, which in turn influences the willingness of end-users of different types to belong to the platform, and hence the value derived from the platform by its owners and operators.

Rochet and Tirole (2005) classify the externalities leading to two-sidedness as either usage externalities or membership externalities, each of which can be more efficiently resolved by the way in which the platform operator structures the allocation of membership and usage costs between the end-users. Crucially, different end-users cannot negotiate the resolution for themselves. If the externalities could be so resolved, then the end users will choose systems of compatible products based only on their own outcomes, leading to pecuniary externalities being efficiently handled through the pricing system alone (Liebowitz and Margolis, 1994). Rather, “the starting point to the theory of two-sided markets is ... that the end-user does not internalise the welfare impact of his use of the platform on other end-users” (Rochet and Tirole, 2004:3).

Consequently, Rochet and Tirole (2005:2) conclude “the platform’s fine design of the structure of variable and fixed charges is relevant only if the two sides do not negotiate away the corresponding usage and membership externalities”. They term the inability for the parties to negotiate away the externalities as pricing ‘non-neutrality’. Non-neutrality can arise as a consequence of the structure of usage pricing, membership pricing, or both. Common factors leading to non-neutrality in usage pricing include the inability for one user of the platform to pass increases in his cost of usage through to the other user, or where a prohibition or constraint imposed by the platform prevents the parties from resolving their transaction price externalities directly, for example when credit card companies impose exclusivity or prevent merchants from charging customers different prices for cash or credit card transactions (pp 10-11). Membership prices may be non-neutral when a platform cannot perfectly observe usage and price it efficiently, leading to a usage subsidy from membership fees, or where the use of fixed fees is an efficient way of capturing end-user surplus, such as in Ramsey pricing or price discrimination (pp 13-14).

Parker and Van Alstyne (2005) further clarify the effect of network externalities. This is of particular relevance when the platform co-ordinates activities in the markets for two or more distinct products (e.g. Adobe as the platform intermediary providing a document reader – product 1 - for one market and a document writer – product 2 - for another). Network effects are insufficient for a finding of two-sidedness if they pertain to the value accruing only to one side of the market. The externality must cross over to the other party and not simply accrue to the platform operator. Likewise, neither is the presence of two different products matched by the platform (e.g. bundling, tying, second-degree price discrimination) or penetration pricing where the platform owner recoups the discount on one product over time from sales of the second product sufficient for a definition of two-sidedness. There must be further externalities in the consumption of the different products (e.g. consumers have the discretion to forego the purchase of one of the products even though the other is purchased) for the special case of two-sidedness to be present.

### **1.3 Information Products and Two-Sided Markets**

A particular cost issue for two-sided markets relates to information. Platform operators can utilise their informational advantages as intermediaries to create value unavailable to the parties individually. “Informational intermediation” consists of services such as search, certification, advertising and price discovery (Caillaud and Jullien, 2003). Informational intermediation can occur separately from any transaction that ensues as a consequence of the intermediation taking place (e.g. trading after parties have been introduced via the platform).

Rochet and Tirole (2003) identify that there is not necessarily any two-sidedness in a transaction that ensues simply from a matching occurring via a marketplace. They illustrate this with examples of a one-sided electricity market with bilateral contracts where generators pay a fee for injecting electricity and consumers a fee for withdrawing electricity, and a VAT taxation platform. The transaction price adjusts accordingly, and there is no externality that can be improved by charging one side a larger or smaller share of the usage fee or the tax. A single information asymmetry in bargaining is thus insufficient for two-sidedness - there must be some further impediment, say to a seller passing the increase in his cost of interacting with the buyer through to the buyer, or where the transaction costs of doing so directly are prohibitive, and are reduced by the presence of the intermediary with a non-neutral pricing structure (pp 9-10).

However, the question arises of how an informational intermediary will charge to recover its costs. A particular characteristic of informational goods is their very high fixed costs of creating the first version, and comparatively small (often near zero) costs of creating second and subsequent versions. For example, creating software for an electronic intermediary to carry out the first match, or establishing a physical marketplace to carry out the same activity, may be very expensive, but each subsequent match made may be near-costless (Shapiro and Varian, 1999; Quah, 2004). It may be efficient both privately and socially for the intermediary to charge for intermediation services by membership (fixed) fees, and extract consumer surplus via both membership and transaction fees (e.g. Ramsey pricing, price discrimination). The pricing structure for the transaction is no longer neutral. This source of two-sidedness is quite distinct from two-sidedness deriving from an information asymmetry whereby the platform operator cannot perfectly observe transactions in order to price them neutrally (e.g. where individuals introduced on the platform can trade off it). The matching a separate information good, distinct from the transactions that occur in the marketplace, that have their own characteristics depending upon elements of marketplace design (McMillan, 2002).

Parker and Van Alstyne (2005) identify that information goods as a class are generally predisposed towards exchange in two-sided markets, and that the increasing number of information products being created and transacted will likely lead to an increase in the number of two-sided markets emerging. The same cost properties that make typical marketplaces two-sided in their matching processes applies to information goods: “the key, however, relies less on nonrivalry than on low marginal costs. When these are negligible, a firm can subsidise an arbitrarily large market based solely on fixed initial costs. Providing



each new sale or service then costs the clever product designer nearly nothing in incremental costs. Increased consumption of information may therefore have the potential to increase the attractiveness of the proposed design strategy” (p 1497). The two-sidedness occurs because the ‘manufacturer’ of information goods becomes the platform operator when either utilising non-neutral prices to sell the good directly (e.g. intermediaries) or by bundling the good in with some other product in a way that leads to externalities crossing the platform, simply because of the economic characteristics of the goods. This suggests no distinction between Caillaud and Jullien’s intermediaries and Parker and Van Alstyne’s platforms giving away software products – both are purveying information goods and utilising non-neutral prices to either recover costs or appropriate surplus.

#### **1.4 Competition Implications**

The major competition implication arising from 2SPs is that their welfare-maximising prices and contractual arrangements violate the competitive principles applied to one-sided markets. For example, it may be welfare-enhancing for parties on one side of the platform (say, females patronising a club) to pay prices less than cost, or prices that differ from those charged to parties on the other side for an ostensibly identical product (say, male patrons, who outnumber female patrons in the club example) in order to maximise total benefits for all participants (that is, to induce greater levels of female patronage than would occur under equal pricing, in order to achieve optimal ‘matching’ of male and female patrons). Likewise, it may be profitable and increase welfare when a monopolist gives away a product to one customer group and recoups the costs from another, or to tie goods. Viewed through a one-sided lens, such actions reduce the utility of one party so are deemed anti-competitive. However, when netted against the increase in welfare to the party receiving the free good, total welfare may increase. The monopolist may be able to both increase profits and increase welfare by operating the platform with apparently discriminatory prices. Antitrust intervention preventing the one-sided reduction in utility therefore compromise total welfare.

Whilst the theoretical economics literature on 2SPs is relatively new, economists have derived many results based upon stylised models that apply to many of Wright’s abovementioned industries. Much of the economic logic of ‘one-sided’ markets does not hold in markets with two sides. Wright (2004) catalogues eight ‘one-sided market fallacies’ that do not apply universally in two-sided markets: that efficient price structures should be set to reflect relative costs (user pays); a high price-cost margin indicates market power; a price below marginal cost indicates predation; an increase in competition necessarily results in a more efficient price structure; an increase in competition necessarily results in a more balanced price

structure; that in mature markets (or networks), price structures that do not reflect marginal cost are no longer justified; where one side of a two-sided market receives services below marginal cost, it must be receiving a cross-subsidy from users on the other side; and regulating prices set by a platform in a two-sided market is competitively neutral.

However, Wright's eight fallacies do not apply uncategorically to all markets with two-sided platforms. What has become clear in examinations of 2SPs is that the optimal outcomes, and the instruments that can be applied to improve welfare, differ significantly due to different underlying economic characteristics of each market. No 'single solution' prevails in all such markets. Generally speaking, though, three results appear to be robust (Evans and Schmalensee, 2005:11):

1. The optimal prices depend in a complex way on the price elasticities of demand on both sides, the nature and intensity of the indirect network effects between each side, and the marginal costs that result from changing the output of each side.
2. The profit-maximising, non-predatory prices may be below the marginal cost of supply for that side, or even negative.
3. An increase in marginal cost on one side does not necessarily result in an increase in price on that side relative to price on the other. More generally, the relationship between price and cost is complex, and simple formulas that have been derived by single-sided markets do not apply.

The common characteristics of 2SPs lead to common determinants of industry structure, and hence common 'outcomes' that do not respond well to the analysis traditionally used to analyse one-sided markets (Evans and Schmalensee, 2005; Wright, 2004). The economics of 2SPs "provides a unified framework, informed by theory and cross-industry empirical studies, for considering competition issues involving 2SPs" (Evans and Schmalensee, 2005:3), as the framework recognises that the "profit-maximising prices for the two sides are linked" (*ibid*, p4). Evans and Schmalensee further encourage the use of 'two-sided logic' not simply for the examination of specific competition and antitrust issues, but more broadly as a policy tool in understanding the scope of, and nature of participant behaviour in, these markets. In this spirit, this paper applies 'two-sided logic' to health care markets, in order to ascertain whether the historic leniency granted in competition and antitrust application could be consistent with the characteristics of markets with two-sided platforms.

## **2. A Taxonomy of Health Care Markets as a 'Two-Sided Platform'**

Competitive leniency in health care markets is generally based upon the presumption that marginal cost prices reduce efficiency, and that an increase in competition would therefore lead to inefficient prices. Can this leniency be attributed to two-sided characteristics? At first glance, it would appear not. Health care delivery markets comprise two parties – patients and service providers – and a single product – health care. The parties interact when a patient consults the service provider. In the absence of a subsidy, no platform exists and there are no network externalities. Service providers and patients interact directly, with prices adjusting accordingly

### **2.1 The Subsidised Care Delivery Market is Not Two-Sided**

But does the presence of a subsidy inducing over-consumption alter the conceptualisation of the market? Rochet and Tirole (2004:7) identify that “a government levying a value-added or excise tax on a transaction between a merchant and a consumer can be viewed as a platform (with the specificity that the use by end-users of the platform is not motivated by the platform’s enabling or facilitating of trade, but results from the State’s coercive power)”. However, the mere presence of a platform is insufficient for two-sidedness: “for a given level of VAT, it does not matter who, of the merchant and the consumer, is charged for it. The transaction price between the two adjusts accordingly”. Leaving to one side the origin of subsidy funds, the effect of the subsidy is directly equivalent to a tax. All else being equal, it does not matter which party receives the subsidy from the platform – the service provider or the patient – the effect on price and welfare in the market for health care delivery are the same.

However, Rochet and Tirole (2005) identify that the platform may structure the contracts relating to each party’s interaction with it, (i.e. membership and usage terms), thereby potentially altering the neutrality of prices and introducing two-sidedness. How might this affect the way in which externalities cross between the end users via the platform?

#### **2.1.1 The Service Provider Does Not Interact With the Platform**

Assume the subsidiser simply pays a fixed subsidy to the patient, and the patient then contracts with the service provider for treatment. The subsidy is a ‘negative price’ (or benefit) of the patient’s interaction with the platform. The service provider has no relationship with the platform, so its decisions cannot affect his costs. The subsidy platform decisions are relevant in the care delivery market only through the ability to influence demand for health care via the patient’s income. The externalities created by the presence of the

subsidy are neither captured by nor shared between the service provider and the patient as a consequence of any interaction between them via the subsidy platform. Thus, there is no two-sided platform in the market for subsidised health care delivery. One-sided logic would appear to suffice in determining the appropriate competition approach. If the subsidy distorts the care delivery market, all that reducing competitive intensity will do is determine who appropriates the gains (i.e. service providers via higher profits rather than patients via more treatments). The total cost to the subsidiser will be the same.

Indeed, Gaynor, Haas-Wilson and Vogt (2001:994) show that even if the subsidy is paid as a percentage of the service provider's fee, one-sided logic is adequate. In the presence of patient over-consumption moral hazard, they demonstrate that if the subsidiser sets the degree of consumer cost-sharing optimally by taking into account the prices in the market for service provision when determining a given patient's subsidy, then adding another competitive distortion (i.e. allowing prices to rise above marginal cost) "cannot wring any further surplus out of the resulting decrease in moral hazard. ... Furthermore, when the medical market is not competitive and already exhibits prices above marginal costs, price increases lead to lower welfare and price decreases to higher welfare". The authors also demonstrate that if price exceeds marginal cost in the care delivery market, the benefit to patients of a price decrease also outweighs the loss of profits to the medical industry<sup>1</sup>. Whilst Gaynor, Haas-Wilson and Vogt's finding hinges upon knowledge of prices in the care delivery market and the patient's propensity to over-consume, Rochet and Tirole (2005) show that simple information asymmetries are insufficient of themselves to lead to two-sidedness.

### **2.1.2 The Platform Contracts the Service Provider for Care Delivery**

Consider now that the subsidiser contracts directly with the service provider for the purchase of care. For simplicity, assume the subsidiser pays the full cost of treatment. These are the circumstances of charity or fully tax-funded care. The patient and service provider then interact (treatment delivery). The service provider's reward is the fee paid as per the delivery contract with the subsidiser, equating exactly with the benefit conferred on the patient. The patient's eligibility to receive subsidised care derives from a relationship quite independent of the care delivery transaction. Again, contrary to the nature of two-sided markets, the direct interaction (usage transaction) between patient and service provider, whilst enabling conferral of the care benefit on the patient, does not of itself result in the sharing of any externalities between patient and service provider across the subsidy platform.

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<sup>1</sup> The authors acknowledge that their findings address only the moral hazard externality, as they did not consider other factors commonly cited in rendering competition in health care markets 'different', such as the presence of nonprofit firms, agency problems in medical markets, and risk selection in insurance markets (adverse selection). However, as the moral hazard problem is the most-cited reason for competitive restrictions affecting price, this element is given precedence in this paper.

Rather, the benefit that typically arises from direct contracting between subsidisers and service providers in health care delivery markets is amelioration of the negative externalities arising from the patients' propensity to over-consume care when receiving the subsidy directly (e.g. the contract restricts the number or type of treatments provided by the service provider to the patient, as in managed care). Intuitively, this is directly equivalent to a special case of Gaynor, Haas-Wilson and Vogt's optimal cost-sharing, in that an informed platform operator averts the consequences of consumer-induced moral hazard by determining ex ante the 'optimal quantity' of care to be supplied at a given price, and then controls for the effect on patient income by selecting which patients receive the now-smaller number of treatments.

Contracts between the platform operator and the care deliverer also constrain supplier-induced moral hazard (Zeckhauser, 1970; Newhouse, 1996). However, this externality can be considered as simply another patient moral hazard consequence arising from the subsidy – patients over-consume because service providers induce such behaviour with patient complicity, knowing that the patient does not pay the full cost. The net effect is the same – amelioration of moral hazard over-consumption arising from the subsidy. The gains will be shared one-sidedly between the subsidy platform and the service provider (as per Parker and Van Alstyne, 2005). Moreover, there is no additional welfare gain from reducing competitive intensity in the care delivery market. To the contrary, relaxation of competitive intensity will simply allow service providers to raise prices above the competitive optimum. Welfare will be highest when competition drives care delivery prices to marginal cost. This is confirmed by Gaynor, Haas-Wilson and Vogt (2001:1001) when they extend their model to account for quantity restriction under managed care.

Further intuitive verification of this logic can be found in other markets funded primarily from subsidies, such as the market for vehicle crash repairs, from tax subsidies, such as the market for school bus transport, or from charity, such as third world child poverty relief programmes. The mere fact that crash repairs are funded predominantly from insurance, school bus transport is fully tax-funded, or poverty relief is paid from charity is not used as justifications for lower standards of competition in the supply markets, simply because of consumer moral hazard in the presence of subsidies (e.g. claiming the costs of repairs to damage unrelated to the accident, inflating the costs of repairs; non-school attendees attempting to get rides, well-resourced children posing as needy). Rather, the externality is most usually addressed by contracts between the subsidy platform and service providers specifically aimed at reducing unjustified consumption (e.g. authorised repairer agreements,

price-and-volume contracts, increased monitoring). Indeed, vibrant competition in these markets is usually welcomed as it leads to lower prices, mitigates many other costs of supplier opportunism associated with the products, and incentivises innovation leading to quality improvements and new welfare-enhancing products and services.

## **2.2 *But the Subsidy Platform is Two-Sided***

When the subsidy platform enters into contracts with the service deliverer in order to reduce patient moral hazard, the question arises of how the savings are allocated. If they are simply appropriated by the platform operator, then as per Parker and Alstyne (2005), there is no two-sidedness. If they are shared with the same patients to whom the care was delivered, then as per Rochet and Tirole (2005), the prices are still neutral. Indeed, such a distribution would defeat the purpose of the contractual arrangement to reduce the moral hazard in the first place, as it simply pays the benefits back to the same individuals who caused the externality. The triviality of this result is starkly illustrated by the crash repair example. The insurance platform does not share the benefits of cost savings with the owners of the crashed cars.

### **2.2.1 The ‘Other Side’ is the Funder**

It now matters where the subsidy funds come from. If, as per Parker and Van Alstyne, the platform operator removes the over-consumption externality from the downstream health care provision market by contractually constraining the activities of either or both of the beneficiaries and care providers, and does not fully appropriate the savings himself, then the only other party with whom the savings can be shared is the party who provided the subsidy funds in the first place. It is the presence of a funder, and the sharing of the over-consumption externality (or the savings from its amelioration) between funder and beneficiary that creates the two-sidedness. The subsidy platform is the two-sided market.

There are two parties to the subsidy platform – donors (or premium payers, tax-payers and beneficiaries (patients). Usage of the platform by the beneficiary (claiming a benefit) invokes a usage cost (the extent of over-consumption) which is shared across the platform with the other members (donors) according to the price structure determined by the platform managers. The platform ‘subsidises’ the patient’s usage fee (the over-consumption), and then levies the additional cost across all donors in exactly the same manner as subscribers receive free newspapers and the publishers charge the advertisers. Prices are non-neutral. Donors participate via the subsidy platform because it is more efficient for them to do so than to administer the donations to beneficiaries directly. But in doing so, the platform takes responsibility for matching donations and beneficiaries, creating two-sidedness. When the cost

causing transaction occurs (a beneficiary claims a benefit), the institutional structure of the donation platform precludes donors and beneficiaries from resolving any externalities that arise (i.e. over-consumption) directly with each other, as surely as Rochet and Tirole's (2005) credit card contract fee exclusions preclude merchants and card-holders resolving the externalities that emerge from cross-subsidies between membership and usage fees. Two-sidedness emerges because of the way the platform decisions about benefit sizes and allocations create or ameliorate externalities and share the consequences between funders and donors.

Thus, it is the act of making the donation that creates two-sidedness, as opposed to the act of utilising the benefit. The structure of 'membership' and 'usage' prices set by the platform operator will determine the number of parties on each side of the platform, its efficiency, whether it is optimal for there to be one or many platforms, whether parties will participate in one platform or will 'multi-home', and many other such issues discussed in the two-sided market literature (Parker and Van Alstyne, 2005). Via two-sided logic, it is in the activities of the subsidy platform that the potential for increases in welfare from relaxation of the one-sided competitive standards in the wider health care market lies. There is no justification for relaxation of competitive standards in the downstream health care provision markets. Optimal outcomes in the downstream market are dependent upon the balancing of prices in the upstream market. A distortion in the downstream market may be able to compensate for the inability or unwillingness of an upstream platform operator to balance the subsidy platform, but in doing so, it either distorts the ability of the platform operator to take, or disincentivises the operator from taking, the necessary steps to optimally balance its prices for either maximum welfare or profits.

### **2.2.2 Moral Hazard is the Transaction (Usage) Cost Shared Over the Platform**

The charges that the subsidy platform levies, and the products being exchanged, will determine platform efficiency. Take the charity model as a base. There is no direct transacting between donors and beneficiaries, although this occurs notionally when the platform operator matches donations with beneficiaries' demands. The donor's membership fee is, in effect, a benefit - the opportunity cost to the donor of having the platform manage the redistribution of the donation relative to the donor undertaking the task himself. This is distinct from the sum actually redistributed – the donation, net of the costs of managing the redistribution. The patient pays no explicit membership fee. The relevant transaction is the patient's request for a benefit, whereby donors' funds are matched with patients' benefit requests.

With no moral hazard, the transactions are price-neutral. With moral hazard, there is a transaction (usage) cost, determined by the elasticity of patient demand for health care services (i.e. benefits), which is shared across the platform with the donors. In practice, the platform nets the additional cost off the donation, but in doing so, it changes the donor's implicit membership fee. Donors' implicit membership fees increase by the share of the patient's transaction costs allocated to each. It is now more beneficial than before for the donor to manage the donation himself rather than to assign the responsibility to the platform. This directly affects the number of donors interacting with the platform, via the elasticity of demand for donation administration services. Those for whom the benefit of donating via the platform (membership benefit) is now negative cease donating, and the value of the platform declines. Optimal prices thus depend in a complex way upon the price elasticities of demand on both sides of the market. Whereas the prices in most two-sided platforms are structured with a view to creating 'virtuous cycles' with the platform growing more valuable as a consequence of positive externalities, in this case the platform declines in value from a negative externality. However, the same logic applies. Parker and Van Astyne's (2005) models explicitly allow for negative network effects.

### **2.2.3 Patient Payments: Contract Incentives or Platform Usage Fees?**

Using two-sided logic, the instruments traditionally employed to reduce moral hazard in a 'classic' health care market take on a different role. In a one-sided view, deductibles and co-payments assume the role of a contractual incentive to constrain patient moral hazard by making the patient pay a share of the costs of every treatment. But co-payments and deductibles are imperfect as they only reduce the size of moral hazard, and penalise the genuinely ill at the same rate as they penalise the 'worried well'. Patient moral hazard will be eliminated only if the patient pays the whole bill – i.e. is not subsidised. All other things being equal, the size of the optimal patient payment in a one-sided market does not depend upon the identity of the donor. All that matters is the patient's demand for care given an income that includes the subsidy (i.e. the propensity to over-consume), and the prices in the care delivery market.

An alternative, two-sided, view is that patient payments are a means of the platform provider calibrating the usage fee and the membership fee in such a way that the effect of the moral hazard externality upon the size of the platform membership on the donor side, and hence platform value, is minimised. In a two-sided market, optimal patient payments will differ in complex ways, depending upon the donor elasticities, patient demand elasticities in the care markets given benefits of different sizes (the demand elasticity for benefits is determined directly from the demand for treatments), and prices in the care delivery markets. Where the



suppliers of funds are not particularly sensitive to the costs of the platform effecting the distribution relative to doing it themselves (e.g. a large number of very small donors, or where the donors are compelled to donate), a change in the patient payment will have less effect than if the sensitivity is higher (e.g. a small number of large donors, with a lower-cost alternative of organising an alternative platform themselves). The patient payment is important not so much in its role of constraining moral hazard *per se*, but in ensuring that total funds available for redistribution do not fall too much as a consequence of the diminution of the number of donors and the size of their donations. By Rochet and Tirole (2005:6), volume of transactions on the donor side of the market is sensitive to the allocation of total platform costs between the buyer and the seller and the subsidy platform is two-sided.

The two-sided taxonomy therefore provides a cogent explanation for an absence of patient payments being far more common in taxpayer-funded systems, where there is no donor sensitivity (taxpayers are compelled to contribute, irrespective of their own personal valuations), than in charity-funded care, where donation is an optional activity. For example, nominal fees are common in union-funded health care clinics, and in other charity care, such as New Zealand's Plunket Society, recipients are encouraged to become donors themselves, if not at the time of receiving the benefit, then in the future, as a means of internalising to some extent the costs of the externality. This finding is consistent with, albeit derived from a different origin, with Gravelle (1999), who demonstrates that optimal patient payments differ depending upon whether or not the patient internalises the externality via a premium payment or is insulated from it by the presence of taxation.

In the two-sided taxonomy of health care markets, deductibles and co-payments play subtly different roles. The distinction relates to the size of the benefit paid to patients. The benefit paid may or may not equal the service provider's fee (for example, a taxpayer-funded system may be designed to meet only a proportion of the total costs of a particular type of care, with the explicit expectation that the consumer pays the balance). If the benefit granted is less than the service provider's fee, the patient must make an out-of-pocket payment to the service provider – the co-payment. This is distinct from a deductible, where the benefit fully covers the service provider's fee, but the patient pays a usage fee – the deductible – to the subsidising platform each time a claim is made. Deductibles are charges shared with donors, whereas co-payments are not.

The two-sided taxonomy of health care markets severs the nexus between moral hazard and the distortions in the downstream markets for care delivery completely. A subsidy platform optimally balancing its membership and usage transactions should need no recourse to a

distortion in a downstream market to deal with the externality that it creates. However, prices in the downstream market will, by their effect upon the extent of moral hazard, play a role in determining price structures in the upstream subsidy market. Thus, competition in downstream markets is desirable as it lowers the total cost of moral hazard by lowering treatment prices, whereas competition for donors in the upstream subsidy markets provides the incentives for subsidy platform operators to develop better algorithms for setting membership and utilisation prices, and to share the benefits with donors rather than appropriating all of them for themselves.

### **2.3 Extension to Insurance Platforms**

It is now a simple conceptual extension to turn the two-sided subsidy platform into a two-sided insurance platform. The only difference is that the beneficiaries now assume membership status on the ‘payer’ side in addition to having beneficiary status on the ‘benefit’ side (Figure 1). It does not matter conceptually that the two distinct memberships are sometimes subsumed in a single individual in a given time period. The contracts on each side are distinct, as the contracts relate to two distinct products – risk management on the ‘donor’ side and ‘treatment subsidy’ on the ‘beneficiary’ side. Whilst the benefit-claimers partially internalise their moral hazard costs as premium payers, the internalisation is incomplete as there is never a perfect match between the premiums paid by an individual and the benefits claimed. The insurance platform thus manages risk on one side and pays benefits on the other.

The distinction between funders and beneficiaries has long been recognised as the core of health care markets. For example, Danzon (1997) identifies the different objective functions of individuals seeking risk management *ex ante*, and benefits *ex post*, whilst Schlesinger (1997) characterises health care as a tension between ‘societal’ interests (broadly incorporating all interests other than those of ill individuals, including wider public benefits) and the interests of the sick and those who treat them. The platform over which the resources are gathered and distributed (hereinafter called the ‘insurance platform’, even though it equally applies to taxation-funded health care systems) will determine the balance between membership and usage fees in order to share the externalities between those seeking and those funding the benefits that the platform operators decide to pay out.

Whilst the conceptual extension to an insurance platform is simple, the nexus between *ex ante* expectations and *ex post* payment of benefits creates two additional externalities that make the establishment of optimal prices more complex, though not intractible. The first relates to

insurance as a classic information product, with attendant network effects. The second relates to the fact that the presence of insurance creates a selection externality that is also shared across the platform in the same manner as the moral hazard effects.

### **2.3.1 An Information Intermediary of an Information Product With Network Effects**

Arrow (1963) defines uncertainty (risk) as an individual's absence of information about if he will fall ill, when this might happen, and how much it will cost to pay for treatments ('non-marketability of risk'). By the law of large numbers, an insurance platform aggregating the uncertainties of a large number of individuals has greater certainty of knowing how many individuals will fall ill in the period, but not their actual identity (Arrow, 1963). An insurance platform can arbitrage upon this informational advantage of knowing with greater confidence the number of individuals likely to fall ill in order to spread the expected costs of treatments (benefits) across all individuals seeking to reduce the costs of their individual uncertainty (premiums). Individuals can pay a certain premium regularly to the platform in order to access a benefit with certainty when the unknown event of falling ill occurs (Milgrom and Roberts, 1992). Welfare rises relative to the case of self-insurance (i.e. those individuals who fell ill and could not pay for treatment get benefits under insurance that would not accrue without it). However, in the process, some individuals who are 'lucky' and don't fall ill pay premia in excess of their benefit costs, and those who are 'unlucky' and fall ill receive benefits in excess of their premia. The platform allocates the ex post realisation of actual costs of the welfare gained across all ex ante risk management seekers.

Insurance is thus a classic 'information good', as per Parker and Van Alstyne (2005), in that it is based entirely upon processing information about risk-seekers and beneficiaries. The platform's value is determined from member information and the ability of the platform's algorithms to use this information to predict likely calls on funds, and thereby spread the costs across members. The better the algorithms, the better the match, and the lower the financial risk to the platform. Insurance platforms allocate costs to premium payers that include a mark-up for managing random risk (the membership fee) in addition to collecting the funds for reallocation.

By the law of large numbers, up to a limit, the more members the platform has, the lower the likely variation between predicted and actual outcomes, and the lower the financial risk to the platform. Insurance thus exhibits the scale effects typical of networks. The more members the platform has, the lower the costs of risk management are. In order to attract members, the platform will share the reduction in costs with the premium payers. However, this is not a simple one-sided sharing of benefits, because any variations in the actual costs of risk

management from the benefit side and the expected costs on the risk management side are shared via the membership fee (e.g. if the platform is extremely unlucky and costs exceed income, the extra costs are shared with all premium payers). This leads to non-neutral price structures for membership (risk management payment) and usage (claiming a benefit) costs.

An alternative conceptualisation is that the insurance platform operates as a classic 'information intermediary' as per Caillaud and Jullien (2003). Those individuals seeking risk management buy an option to receive benefits if falling ill in a given time period. Those individuals falling ill 'call in' their options. The insurance platform operates as a sophisticated marketplace whereby the buyers and sellers of options are matched. In effect, the platform becomes the buyer to all sellers and the seller to all buyers when it assumes and manages the respective risks. Membership and usage prices become bundled in with the actual prices paid in each market when risk is exchanged on either side of the platform. The platform is continually 'trading' externalities created by chance (i.e. its algorithms for pricing ex ante assumption of risk differ from the actual risk called in) across the platform between premium-payers and beneficiaries as well as moral hazard and other externalities when setting membership and transaction fees bundled in with its risk management prices (premiums and benefits). With certainty, the prices set will never be perfect, simply because of random effects. The very structure of the platform prevents the respective end-users from perfectly internalising the effects of their actions on the other parties

### **2.3.2 Adverse Selection as a Negative Network Effect?**

The more members a platform has, and the better its algorithms for assessing risk and sharing the externalities, the lower its costs of risk and operational management, and the more desirable it becomes to new members. In a competitive market, this suggests a tendency towards monopoly. However, an adverse selection externality also exists, simply because of the platform's information asymmetry in being able to predict exactly via its algorithms which individuals will actually fall ill. The individuals who find insurance most desirable are those most likely to fall ill. More of them will buy insurance than people of average and good risk, thereby making the total risk borne by the platform higher than expected (Zeckhauser, 1970; Cutler and Zeckhauser, 1998).

The selection externality is shared across the platform in exactly the same way as the moral hazard externality in the subsidy platform. If their higher risk is not able to be detected and priced ex ante via the premium, costs on the benefit side increase. On the one hand, this drives up the membership fee, leading to smaller membership, greater variability in platform profits and even higher membership fees, but this effect is in part compensated by a higher

number of usage fees paid by the over-consumers. Whereas the solution to the over-consumption externality was to adjust prices on the benefit side, the solution to the selection externality is to selectively adjust membership fees, to reflect different probabilities (but not actual costs) of new members (for example, group discounts for large number of employees of a single firm if they join together, relative to the price charged for a lone individual).

Thus, just as with other two-sided platforms, membership (premium) and usage (benefit) prices on insurance platforms can be structured to attract more members, thereby taking advantage of scale effects, and minimising the effect of externalities that would reduce the value of the platform if confined only to the parties on the side of the platform where the externality arises. The principles are the same, even though the bundling of many different effects into single prices may be complex. The trading off of the different effects is used to determine the optimal size of the platform the nature of competition between platforms, whether the platform should aim to monopolise the market, whether it is desirable to allow multi-homing, and other strategic decisions that are available to two-sided platform operators (Eisenmann, Parker and Van Alstyne, 2006).

The literature already contains some examples where insurance platforms are construed, either explicitly or implicitly as two-sided platforms. Eisenmann, Parker and Van Alstyne (2006) identify United States Health Management Organisations (HMOs) as two-sided platforms, linking doctors and patients. In a similar vein, Bardey and Rochet (2006) develop an explicit two-sided model where HMOs sell policies to patients on one side and contract with doctors to provide treatments on the other. Their model is based upon using more generous benefits to attract patients with higher likelihood of falling ill, thereby generating greater volumes of benefit payments. They suggest that the HMO can use the greater volume of treatments generated to negotiate a lower price with doctors, which is then shared across the platform with patients, thereby increasing membership. The selection and moral hazard externalities, and the use of provider contracts as a constraint in this paper directly parallel Bardey and Rochet's construction, with the exception that Bardey and Rochet do not explicitly distinguish between the ill patient and the treatment purchased for that patient. Whilst not specifically constructing a two-sided platform, Biglaiser and Ma (2003) use distinctions based upon different valuations of benefits from those seeking risk management from those actually falling ill from specific illnesses to derive conditions whereby it may be optimal for the management of risks relating to these illnesses to be served by different insurance platforms (i.e. carve-outs). Again, the parallels with this paper and its use of the different price elasticities of demand for membership and demand for benefits as factors

determining optimal membership, usage prices and the strategic approach to the number of platforms operating in a given market, are clear.

### **2.2.3 Summary**

Insurance is thus a sophisticated subsidy and information intermediary platform with network effects. It embodies multiple causes of two-sidedness - the moral hazard externalities of subsidy, an information product with network effects, information asymmetries that combine with the information product to create adverse selection externalities, and the inherent characteristics of all intermediaries whereby the fixed costs of establishment and operation must be shared across members of different types. Premiums and benefits thus are complex bundles of prices of exchange plus membership and usage fees. The externalities shared may be either positive or negative, with effects in different directions often occurring simultaneously within the same platform. Consequently, there are many reasons why two-sidedness exists, and therefore many potential justifications why it may be optimal to share externalities across the platform in ways that affect membership and usage fees of different classes of users differentially.

That insurance markets are ‘different’ has long been recognised by competition law. Mergers have been allowed in order to capture benefits of scale, exclusive contracts have been tolerated, and price discrimination in order to better manage risk is generally acceptable. This paper suggests that the need for these discretions arises from its two-sided characteristics, and that this provides a rich vein of new learning in the study of two-sided markets and competition approaches generally. It also serves to reinforce the thesis of this paper that it is in the upstream insurance market that the justification for competitive leniency in health care markets exists, and not the downstream health care provision markets<sup>2</sup>.

### **2.4 Is Health Insurance Different?**

The discussion so far has identified that all insurance platforms are in fact highly complex two-sided markets. Whilst proportionately more individuals purchasing health insurance make claims than those purchasing accident or fire insurance, the two-sided market structures are equivalent, albeit with different membership and usage fee structures reflecting the different market characteristics. This begs the question of whether there are any other differences leading to additional externalities that might justify the second-best distortion in health care provision markets.

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<sup>2</sup> In a recent New Zealand case where two insurance companies sought clearance to merge, the Commerce Commission clearly identified the relevant costs and benefits as pertaining to the upstream insurance market and not the downstream hospital market.

A significant difference between health and other insurance is that a second subsidy typifies the health insurance market. Whilst the presence of any insurance platform creates a treatment (benefit) subsidy, health insurance platforms often embody a membership subsidy, where an employer, government or some other charity entity (the ‘sponsor’) pays some or all of the premium for an individual seeking ex ante risk management (Van der Ven and Ellis, 2000). For example, employers and governments commonly subsidise premium payments made to explicit insurance firms, or in the case of governments, fully fund and operate the insurance platform itself, in the form of a Ministry. In either case, the effect is the same – a second subsidy platform is established (Figure 2).

The premium subsidy poses a problem for the manager of the insurance platform. A premium subsidy alters the demand for membership by different groups of individuals in ways that at first blush are opaque to the insurance platform operator. Without information about the subsidies, the platform operator cannot ‘balance’ charges on his platform optimally. For example, a decision by the premium sponsor to subsidise individuals differently for non health-related reasons will affect the optimal membership fee for both, even though they are both of identical ex-ante risk profiles and even though the treatment subsidy effects on income are identical, as the elasticities of demand for both risk management and benefits for the subsidised individuals have now been altered (for an example, see Howell, 2007). The individual with a higher premium subsidy will have a higher propensity to over-consume, therefore optimally requiring a different usage fee. Setting optimal price structures is thus substantially more problematic for operators of health insurance platforms than operators of other platforms such as vehicle or fire insurance. But it is not insurmountable. Contractual arrangements with service providers and information search overcome information problems with the downstream care providers. Likewise, contractual or other arrangements solutions (e.g. investment in information gathering) may equally minimise the effect of the asymmetry regarding an upstream subsidy market.

Abrogation of the responsibility for balancing insurance platform payments in favour of correction via distortions in the downstream market appears naïve. Both competitive and political pressures force insurance platform operators to continually search for ways of reducing costs/increasing profits and/or delivering more benefits for the same inputs. In a two-sided platform, this is achieved by better information, better algorithms for allocation of risk, and the search for different allocations of costs across the different types of members and different types of usage transactions. In a dynamic market, even in the presence of subsidy, the pattern of market development has been convergence on health care markets where

concerned premium sponsors “play a major role in assuring that insurance coverage is universal and affordable, but with competition in the provision of insurance and medical care, in order to stimulate efficiency and provider responsiveness to consumer preferences (Danzon and MacLaine, 1994:81).

Relying upon distortions in downstream markets to generate efficiencies will actually disincentivise insurers from undertaking any activities that result in more efficient platform operation. It would appear that such a justification would prevail only in markets where a monopolist insurer facing no competitive or weak political pressure seeks to avoid having to invest effort to manage the platform more efficiently, or where service providers with market power wish to appropriate higher surpluses. Neither of these scenarios is consistent with increases in welfare. There appears to be no justification, even in subsidised markets, for competitive leniency in health care delivery markets.

### **3. *Conclusion and Implications***

This paper has developed a taxonomy of health care markets as an upstream funding market and a downstream care delivery market. It does not matter under the taxonomy whether the upstream platform is an insurance platform balancing the demands on the one side those seeking risk management and on the other those of benefit-seekers, or a simple donation platform where donors pay in funds to buy benefits for specified individuals. In either case, the platform is two-sided, in that externalities are shared across it between the participating parties. The key is that the very nature of the platform prevents the individuals from resolving the externalities directly. The ways in which the platform operator structures the prices will determine the profitability of the platform, and total welfare from its operation. The addition of more relationships between the parties simply adds additional complexity for the platform manager to take into consideration when setting prices.

The taxonomy thus provides a robust means of examining the competition implications for health care markets, irrespective of the source of subsidy in the treatment markets. The conclusion is that the presence of subsidy, whether a treatment subsidy or a premium subsidy, makes no difference to the desirability of competition in the downstream market. Competition will deliver higher welfare in all circumstances. If there is a case for competitive leniency, it relates to the operations of the subsidy platform, as a consequence of its two-sidedness. For example, scale may matter for optimal insurance, or discriminatory prices may increase welfare. As with all two-sided platforms, welfare is maximised at prices other than marginal cost of interaction on each side, as a consequence of externalities being shared



across the platform. The case for competitive leniency in health care delivery markets simply from the presence of subsidy has been dismissed.

This paper thus adds charity and insurance platforms to the group of two-sided platforms of interest to economists and competition lawyers. The multiple externalities resolved over these platforms make them an interesting, if highly complex, examples. A two-sided taxonomy has been used in this paper to provide alternative explanations for some of the instruments used in insurance and charity markets, such as deductibles and co-payments. More rigorous modelling of the platforms along the lines suggested in this paper will certainly yield other interesting results. The categorisation of subsidies where there is imperfect internalisation between a common beneficiary-funder suggests the potential exists to use two-sided market models to provide insight into a range of taxation-funded public funding policy questions. For example, the question of whether governments favour a single provider of subsidised services, or provide vouchers allowing beneficiaries to select between competing platforms for all of their interactions, or even to use multiple platforms (multi-homing) might usefully be informed by the modelling approach used in this paper.

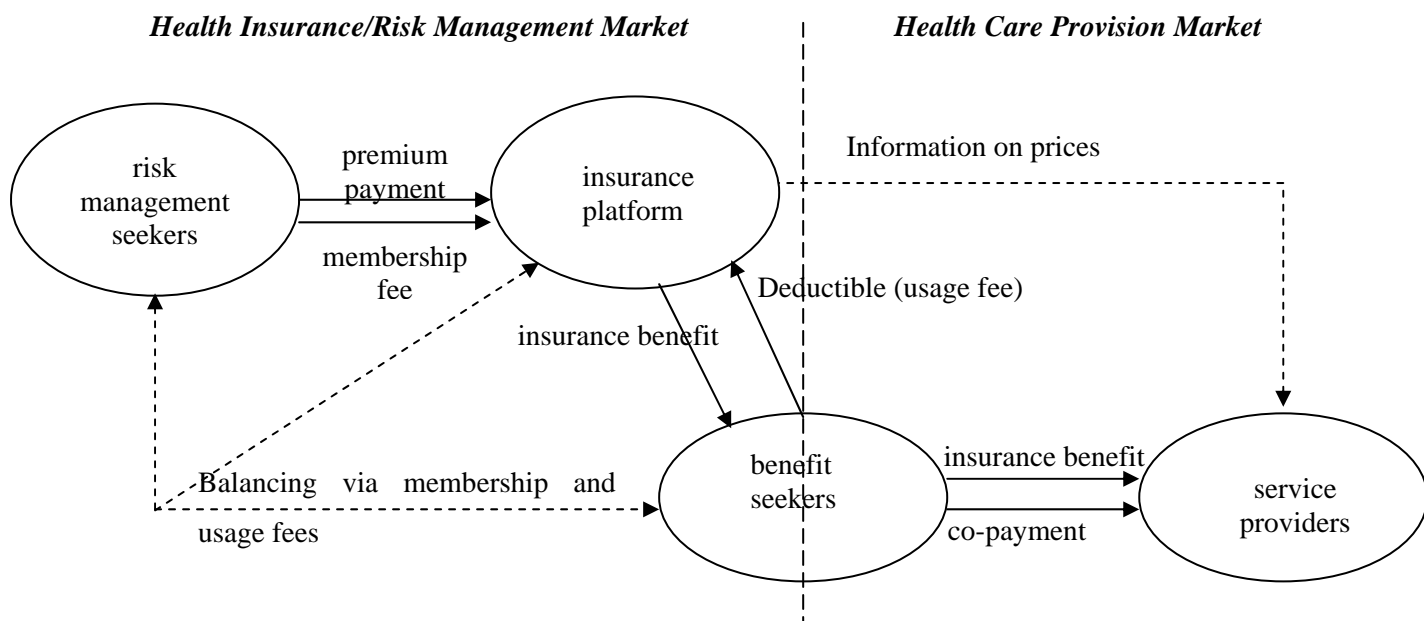
The implications of this paper, whilst originating in the funding of health care, thus potentially stretch far wider. As Evans and Schmalensee (2005) indicated, two-sided logic has been a useful policy tool in understanding the scope and nature of participant behaviour in health care, and potentially other markets as well.

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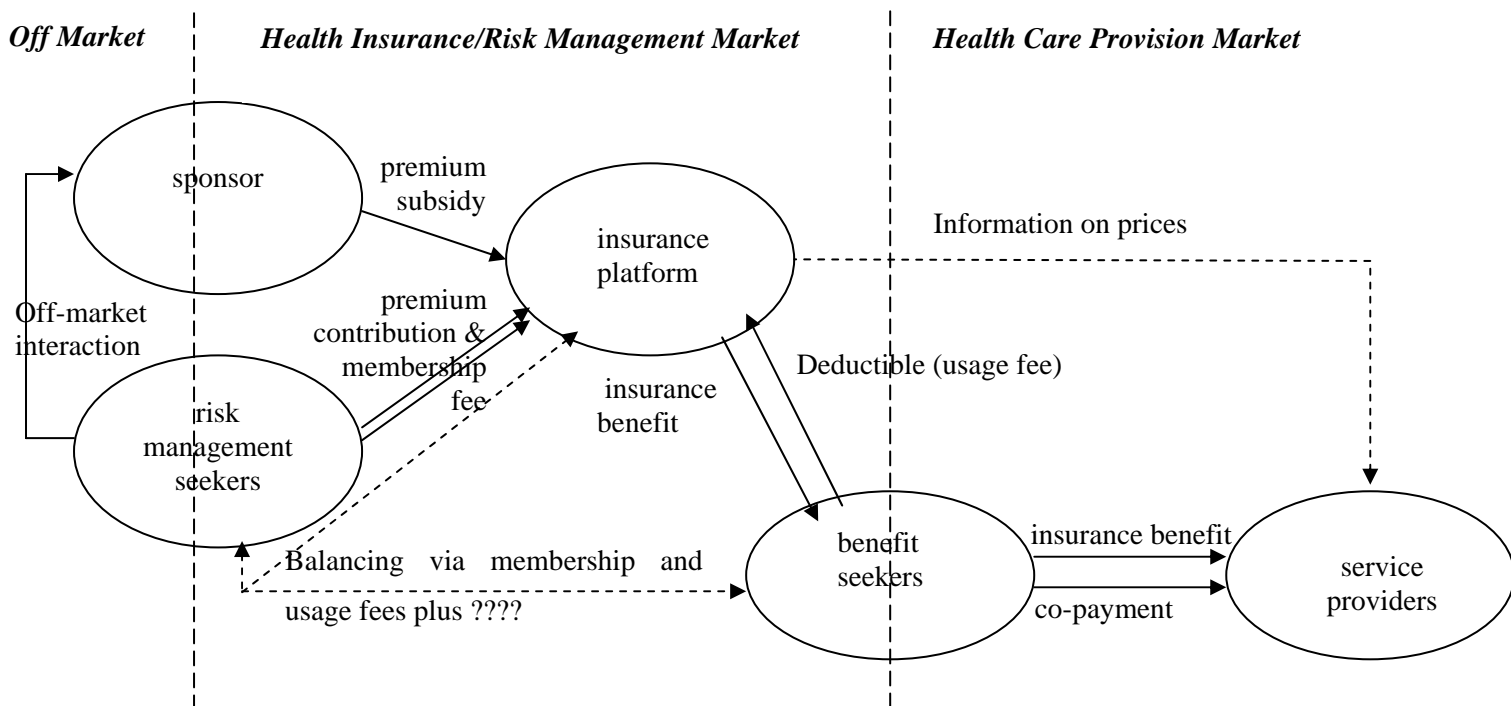
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**Figure 1. Health Care Markets: Two-Sided Insurance Taxonomy**



Adapted from Rochet and Tirole (2002:552)

**Figure 2. Health Care Markets: Including Premium Subsidy**



Adapted from Van der Ven and Ellis (2000:761) and Rochet and Tirole (2002:552)