ESM0037

<AT>asymmetric information</AT>

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Classifications: competitive advantage; foundations; key concepts/overview; knowledge aspects of strategy

<DF>Definition</DF>

Asymmetric information is a state where one party has or will have a greater level of knowledge relative to another party about their own characteristics or actions.

<ABS>Abstract</ABS>

The product of momentous advances in economic theory, the concept of asymmetric information is of great relevance to strategic management. The effects of asymmetric information primarily involve unobserved characteristics or actions that result in adverse selection and moral hazard. Signalling and screening may remedy adverse selection, and optimal contract design may remedy moral hazard. Notable uses include quality disclosure, firm capitalization, limit pricing and advertising.

<KW>Keywords: adverse selection, game theory, information and knowledge, moral hazard, signalling</KW>

Virtually all organizational decisions involve asymmetric information, including those entailing the employee hiring and monitoring employees, pricing products, buying inputs, accessing capital, or market entry. As economists have discovered, in any of these contexts, information asymmetry has a profound effect on both individual decisions and market outcomes.

The incorporation of asymmetric information revolutionizes many of the fundamental findings of economic theory. As Stiglitz (2000, 2002) notes, standard economics results (i.e., on marginal cost pricing, efficiency wages, full employment, markets with one price, efficient asset prices and Pareto efficiency) may not hold under asymmetric information. While theoretical recent work has begun to incorporate elements of asymmetric information in a general equilibrium model (e.g., Bisin and Gottardi, 2006; Zame, 2007), most economics and strategic management literature adapts to these settings by providing novel strategies for organizations.

This article overviews economic and strategic management research involving asymmetric information and provides additional applications of these models relevant to strategic management. Areas of asymmetric information fall under two categories: *unobserved characteristics*, or transactions where one side knows more about the goods and services being transacted than the other does, and *unobserved actions*, or strategic interactions where one party will be unable to observe the future actions of the other.

<H1>Asymmetric information with unobserved characteristics: adverse selection</H1>

In the most well-known model of asymmetric information, Akerlof (1970) explains that any used car market is characterized by *adverse selection*: the average quality of cars on the market is worse than the average quality of all used cars. Sellers know the quality of their cars; buyers lack this information. If buyers cannot differentiate on quality, they must pay the same price for all used cars. Sellers of sufficiently high-quality cars will not be willing to sell at the market price, but sellers of low-quality cars will be happy to dump them on the market, leading to a lower-than-average-quality used car market.

Akerlof's finding – that asymmetric information in a competitive market produces inefficiency – has profound implications. In the used car market, high-quality cars cannot be sold, even if buyers would be willing to pay a price greater than the seller's valuation if they knew a car's true quality. Buyers cannot distinguish high-quality cars from others and cannot believe sellers' claims because any seller could make such claims.

Since the strategy of firms fundamentally involves markets, adverse selection has clear applications to strategic management; indeed, any market with features similar to those of the used car market may feature adverse selection. Recent studies find it in markets for insurance (Einav, Finkelstein and Cullen, 2010; Finkelstein and Poterba, 2004), used aircraft (Gilligan, 2004), and even Mauritian slaves (Dionne, St-Amour and Vencatachellum, 2009). Recent theoretical work shows adverse selection can explain the limited use of electronic markets (Overby and Jap, 2009) and the absence of private unemployment insurance (Chiu and Karni, 1998).

<H1>Solutions to adverse selection: signalling and screening</H1>

Unlike Akerlof's used car market, most markets can overcome information asymmetry because they feature methods that enable the uninformed side to become informed, thus allowing transactions to take place. Two similar solutions, *signalling* and *screening*, differ concerning which party acts first. In signalling, the informed party credibly discloses private information. By contrast, screening occurs when the uninformed party provides a mechanism to incentivize the informed party to credibly disclose private information.

In the first discussion of signalling, Spence (1973) reasons that, like the used car market, labor markets feature individuals who are higher quality (more productive) than others. It

is in the interest of firms to employ all workers but to pay more (less) than an average wage for more (less) productive workers. Yet, without information about workers' characteristics, employers must pay a uniform wage.

The situation is not as dire as the used car market, however, because highly productive workers have ways to signal their characteristics. Spence reasons that high-productivity individuals can take classes to show their superior productivity. Low-productivity types may prefer to avoid mentally taxing schooling and accept lower-paying jobs, while high-productivity individuals would be more willing to take the classes necessary to acquire high-paying jobs. In this manner, both types truthfully reveal their quality by choosing different courses of action. Interestingly, this initial result does not require any productivity returns on education (though Spence (2002) includes such a feature). Empirical investigations support the predictions of education as a signal (Bedard, 2001).

Signalling is a popular topic in the field of strategic management (Connelly et al., 2011 provide a survey), as firms desire to signal their strength and that of their products. Most notably, a firm can benefit by signalling through the composition of its board (Higgins and Gulati, 2006; Miller and Del Carmen Triana, 2009) and CEO (Zhang and Wierseman, 2009), corporate restructuring (Bergh, Johnson and Dewitt, 2008), adding '.com' to their name (Lee, 2001), their geographic scope (Bell, Moore and Al-Shammari, 2008), and interorganizational partnerships (Gulati and Higgins, 2003).

In a seminal example of screening, Rothschild and Stiglitz (1976) consider an insurance company that offers the same policy to all customers because it is unable to differentiate customers' riskiness. The policy is competitive, allowing a customer with average risk to break even; thus, the policy is profitable (not profitable) for all customers who have

above- (below-) average risk. This leads to adverse selection, as the riskiness of consumers who buy this policy will be greater than that of the general population. Thus, the insurance company will lose money on this policy. Alternatively, the insurance company could design multiple contracts that customers can select based on their potential riskiness, a process called *screening.* Rothschild and Stiglitz find that when conditions for screening do not exist, a rational insurance company will offer no policies. Most empirical work involving screening concerns insurance markets (Fang, Keane and Silverman, 2008; Newhouse, 1996). Other applied work includes designing optimal debt instruments (Biais and Mariotti, 2005), educational policies (de Fraja, 2002), and gate-keeping usage in market transactions (Shumsky and Pinker, 2003). The earliest theoretical work on screening predates Akerlof; Vickrey (1961) and Mirrlees (1971) share a Nobel Prize for their work on the optimal design of auctions and income taxation, respectively.

<H1>Equilibrium concepts in signalling and screening games</H1>

The results of Rothschild and Stiglitz (1976) and additional equilibrium refinements (Kreps and Wilson, 1982; Milgrom and Roberts, 1982) provide three general types of equilibria in signalling and screening games. In pooling equilibria, all types of players with varying characteristics choose the same action, causing the uninformed party to learn nothing at equilibrium. Conversely, in a separating equilibrium, each type of player performs a different action, revealing his type to the uninformed player. In a semi-separating equilibria, one or more types randomizes over possible actions, allowing the uninformed party to make better inference about the types of the informed party.

In many of these games, such as with Spence's signalling model, there can exist a multitude of these types of equilibria. Riley (1979) proposes a criterion to eliminate some of the more unintuitive, Pareto inefficient equilibria. Cho and Kreps (1987), Banks and Sobel (1987), and Cho and Sobel (1990) develop equilibrium refinements, under which, if certain assumptions are met, the remaining equilibria all satisfy the Riley criterion.

<H1>Asymmetric information with unobserved actions: moral hazard</H1>

The aforementioned examples of asymmetric information all concern unobservable characteristics: those that are known in the present time to the informed party. In another class of asymmetric information known as unobservable actions, at the time of transaction, one party's future actions will be unobservable to the other. If this information asymmetry causes the informed party to behave in a way detrimental to the uninformed party, then there is a *moral hazard* (Arrow, 1971).

An example of moral hazard involves an employer paying an employee for unobserved services. With a fixed wage, the employee has the incentive to shirk. Other contracts alleviate this issue; both Stiglitz (1974) and Akerlof (1976) note that sharecropping features contracts where sharecroppers receive a share of the harvest, thus giving them an incentive to work hard. Hart and Holmstrom (1987) provide a description of optimal contracts under a variety of situations. In the strategic management literature, Perkins and Hendry (2005) and Sliwka (2007) empirically examine contracts for executives where moral hazard exists.

In situations where such contracts are impossible, wages generally must be higher than market-clearing levels to induce worker productivity. Both the threat of unemployment (Shapiro and Stiglitz, 1984) and the desire for positive reciprocity (Akerlof and Yellen,

1990) may motivate workers to increase productivity and thus underlie management's reasons for higher wages. Survey and empirical data confirm that these factors affect labor market performance (Bewley, 1999).

<H1>Applications to other types of strategic management</H1>

Milgrom (1981) and Grossman (1981) both theorize that a market failure need not occur with asymmetric information provided sellers have the option to credibility disclosure quality. At equilibrium, competitive forces cause sellers to reveal all quality information to buyers. However, Dranove and Jin (2010) provide a survey of empirical literature on this topic and rarely find full disclosure. They reason that the numerous assumptions required for this equilibrium prediction to hold are unlikely to be satisfied in most settings. Brown, Camerer and Lovallo (2012, forthcoming) argue that the assumption of full strategic thinking is largely responsible for the lack of total disclosure and find empirical support in the motion picture industry.

Myers and Majluf (1984) argue that the stock market has an adverse selection of low-profitability (low-quality) firms. Since some investors cannot differentiate firm quality, the market undervalues high-profitability firms and overvalues low-profitability firms. This incentivizes highly profitable firms to finance their projects with debt and low-profitability firms to issue more stock, leading to adverse selection. John and Williams (1985) suggest high-quality firms overcome this problem by signalling their profitability through dividends, a signal too costly for low-profitability firms. Recent management research suggests that private (rather than public) investment also functions as a signal for profitability (Busenitz, Fiet and Moesel, 2005; Janney and Folta 2003, 2006).

Economists often theorize that monopolies use limit prices, or prices that are lower than profit-maximizing to deter other firms from entering their market. Milgrom and Roberts (1982) provide a model of this pricing where a monopoly signals its competitive strength to possible new firms through limit pricing or profit maximizing. In the model, weaker firms have an incentive to use limit pricing to mimic stronger firms and deter firm entry. Equilibrium conditions exist for pooling, separating, and semi-separating equilibria. Extensions of this model are prevalent in economics and industrial organization literature (Tirole, 1988, and Riley, 2001, provide surveys). For example, Srinivasan (1991) expands the standard model to allow the monopolist to limit price across several markets. Signalling provides an excellent justification of corporate advertising expenditure. Nelson (1974) suggests that advertising may be beneficial for products where purchase is necessary to determine quality. Klein and Leffler (1981) and Milgrom and Roberts (1986) formalize Nelson's ideas in models where firms with high-quality products benefit from advertising, provided they will have repeated interactions with customers. In further extensions, Kihlstrom and Riordan (1984) argue that with identical quality goods, equilibria exist where all firms advertise the same amount. Wernerfelt (1988) examines how a multiproduct firm can promote all products by signalling its general firm quality. In recent empirical work, Basuroy, Desai and Talukdar (2006) find evidence of advertising as a signal in the motion picture industry.

<SA>*See also* adverse selection; moral hazard; perfect information; signalling</SA>

<IND>asymmetric information, screening, quality disclosure, firm capitalization, limit pricing, advertising, game theory, incentive contracts, equilibrium refinements</IND>

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