

AN ECONOMIC THEORY OF ATTITUDES

MATTHEW G. NAGLER

The City College of New York, mnagler@ccny.cuny.edu.

This paper examines the role of a person's attitude, or mental position with regard to an object, in explaining economic behavior. Observations drawn from research and "real-life" examples form the basis for a utility function that incorporates attitudes. Employing the utility function in a model of decision-making, I use comparative static analysis to examine the effect on economic outcomes of price-driven, and other exogenous, attitude changes. The model's analysis is then applied to investigate the implications of attitudes for motivating people, fighting terrorism, and fighting the spread of AIDS. In each of these cases, incorporating attitudes substantially improves the ability of economic analysis to explain observed outcomes and provides the basis for developing more effective private strategies and public policies.

Keywords: Utility functions; Consumer decision-making; Behavioral models; Public policy; Frame of reference.

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I. Introduction

“Ceci n’est pas une pipe.” (This is not a pipe.)
-- *Caption on the painting of a pipe by René Magritte.*

Economics is the study of agents: that is, it focuses on people’s *actions*, such as whether to buy a certain car, accept a certain job offer, practice a certain religion, or engage in civil disobedience. Economists are particularly interested in how changes in strategic or policy variables affect the actions people choose. In examining these effects, they tend to treat the agent’s relationship to the action-object as immutable. Shifts in prices, taxes, and so forth are assumed to hold the relationship inviolate, so that one may observe in isolation any change in the agent’s response to the product or activity in question. This assumption is the basis for many common applications of comparative static analysis – for example, examining how sales of alcoholic beverages will be affected by the increase in an excise tax.

But even the most casual empiricism suggests that the assumption of a fixed agent-object relationship is naïve. People change their perspectives on the products and activities about which they make decisions for many reasons. An increase in the price of a car might cause a consumer to revise her perception of its quality. The offer of a bonus incentive might change a worker’s view of her job, causing her to look on it as less enjoyable and more a thing that she is doing just for the money. Bed and breakfast guests, who would otherwise look unfavorably on last-minute cancellation as “leaving the proprietor in the lurch,” might view such behavior as perfectly acceptable after a deposit forfeiture policy is imposed. When a government represses a religious minority, once-

secular members of the group may suddenly find new meaning in the group's rituals as an act of defiance.

This paper introduces the concept of *attitude* – a person's mental position with regard to an object – into economics.¹ Attitudes are a well-defined and extensively-studied concept in psychology.² According to the most popular psychological conceptualization, the expectancy-value model, an individual's attitude toward an object represents a summary conception or evaluation based on his or her cognitions, or beliefs. Each belief associates the object with a certain attribute, and a person's overall attitude is determined by the subjective values of all the attributes, interacted with the strength of her beliefs associating the attribute with the object (Ajzen 2001, Malhotra 2005).

Psychology tells us that attitudes change, and that such changes have implications for behavior. The canonical tricomponent model of attitudes posits that changes in beliefs about an object tend to cause a person to attach new feelings to it, and these in turn drive changes in preferences and choices (Grimm 2005). For example, if a person obtains information about a product that causes her to have more positive beliefs about it, such as that a car gets better gas mileage than she had previously thought, she will feel more positively disposed toward it and will be more likely to buy it. It should be clear, then, that when we consider agents' tendencies with respect to economic actions, we stand on shifting ground. Often, the very factors the effects of which one seeks to examine – prices, policy variables and such – are responsible for the shifting. In view of

¹ There is excellent precedent for introducing psychological concepts into economics. In writing this paper, I have been inspired particularly by Akerlof and Kranton's (2000) introduction of identity into economics. I have consciously followed their template in many respects.

² See Wood (2000) and Crano and Prislin (2006) for recent surveys.

this, conventional economic approaches to analyzing people's behaviors may require substantive re-examination.

This paper will attempt to put attitudes in perspective within the discipline by casting the agent's attitude as her *frame of reference* on an object. The analogy to physics is instructive. Psychological conceptualizations suggest that attitudes remain the same until changed by new learning (Greenwald 1968). Similarly, particles remain in the same physical frame of reference and have the same relationship to each other and to the observer until a force acts upon them. Thus, as with physical reference frames, attitude states are well-defined, stable, and empirically measurable. And, as in physics, one may test theories about how economic agents' behaviors change as their frame of reference changes.

Part and parcel of this approach is the recognition that an object is *indistinguishable* from the agent's perceptions of it. Changing the perceptions is *economically equivalent* to changing the object itself. A manufacturer's decision to raise the price of a car transforms the car. A government's decision to repress religious practices transforms the practices.

In the next section, I present a series of examples of economic phenomena in which attitude is relevant. These examples and supporting empirical evidence suggest four major observations:

- (i) A person's expected payoff from an action depends upon her attitude toward it.
- (ii) People's attitudes may change with prices – or, more generally, the perceived costs of engaging in actions.

- (iii) Third parties can induce changes in people's attitudes.
- (iv) People may induce changes in their own attitudes.

A theory about attitudes expands economic analysis in at least four corresponding ways:

First, as suggested above, it makes clear the role of *perception* in consumer decision-making and other economic behavior. People make choices not based on how things are, but on how they appear to them to be, based on their attitudes. For example, a consumer buys a product not because it has certain characteristics, but because she *believes* it has certain characteristics. Making this explicit can make it easier to understand the different choices made by different consumers, as well as differences in one consumer's choices over time, particularly when the choices faced are otherwise unchanged.

Second, a theory of attitudes can explain why changes in prices and policy variables in diverse situations may have the opposite effect from what one would expect. Why should people clamor for a good after its price has increased, in apparent violation of the law of demand? Why is it that increasing wages or other monetary incentives might actually reduce labor productivity under some circumstances? The answer is that, while prices and other cost-related variables have direct effects on behavior that conventional economics attends to well, they also may have seemingly perverse *indirect effects* on behavior – through attitudes – that cut the other way.

Third, a theory of attitudes indicates a new way that behaviors may be changed and, in doing so, creates a basis for new public policy and private strategic

recommendations.³ Rather than just using direct incentives – the staple of traditional economic policy – one may modify agents’ responses via changes to beliefs and/or feelings.⁴ Here, psychological and marketing research provides some insights.

Fourth, in revealing that agents may exercise choice not just over actions, but attitudes with respect to actions, the theory reveals an additional layer of complexity inherent in the agent’s optimization problem. For example, when faced with a choice between a desirable but costly option and a less costly but less desirable alternative, the agent could choose the costly option or, potentially, change her attitude and decide the less costly option is actually better after all. This “sour grapes” scenario indicates that individual discretion over attitude might conceivably offer people opportunities to make themselves better off, relative to having a fixed attitude, and might therefore be an integral part of the decision calculus.⁵

The four observations reveal some analytical parallels between attitudes and identity.⁶ Indeed, one may think of identity as a special manifestation of attitude – one’s attitude toward oneself. The focus of this paper will, however, be attitudes toward actions, and as such there are important differences from the analysis of identity. First, because an action is the object, perceived characteristics of actions will be front-and-center in the analysis of attitudes. This means prices will play an important role, whereas

³ In the rest of this paper, I will refer to both public policies and private strategies collectively as “policies.”

⁴ Advertising is one area in which behavior modification through beliefs has been explicitly discussed by economists. See, for example, Dixit and Norman (1978). Most of the literature, however, simply posits advertising as a demand shifter; the cognitive mechanism by which advertising affects behavior is not considered in any detail. In some modeling work, the cognitive basis for advertising’s effect is set aside entirely. For example, Becker and Murphy (1993) offer a model of advertising as a good that is complementary with the future consumption of other goods; see also footnote 8 *infra*.

⁵ Unawareness may, of course, pose a constraint with respect to personal attitude choice. For example, a health care worker who experiences an exposure to contaminated blood might rationalize the decision not to get an HIV test by convincing herself that she is not at high risk; most people in this situation are unlikely to be aware that they have changed their beliefs to reduce cognitive stress.

⁶ See Akerlof and Kranton (2000), p. 717.

they do not figure prominently in the analysis of identity. Second, because an attitude operates at the level of an individual action, attitude change will generally change a person's frame of reference on that action independent of other actions.⁷ Meanwhile, because identity applies to the person, a change in identity typically changes the person's frame of reference on *all* things at once, at least insofar as identity is relevant to one's perspective on those things.

The recognition that people have variable relationships to decision objects is not entirely new to economics.⁸ But, to my knowledge, there is no previous economic literature that considers such variability without restriction to a single phenomenological context (e.g., preferences that depend on prices because people judge quality by price); or that, in considering multiple phenomena for which a variable agent-object relationship is a defining element, ties these to a common underlying cognitive mechanism. This paper, with the support of prior psychological research, struggles to do both. The purpose is twofold: to improve the ability of economic analysis to explain a broad range of

⁷ Of course, this is only true to the extent that actions are independent. For substitutes and complements, for example, attitudes toward one action may be quite relevant to decisions about other actions.

⁸ Becker (1996), for example, allows for the endogeneity of consumer tastes. He models social and intertemporal interdependence in preferences as involving complementary choices – for instance, in the case of a fad, one person's choice is simply a complement to the choice of someone else. See also Stigler and Becker (1977) and Becker and Murphy (1988, 1993). Becker's approach, however, deliberately avoids consideration of the cognitive underpinnings of the relevant behaviors, whereas my approach addresses them directly. Other efforts to model taste change and endogeneity without examining the cognitive basis of these phenomena include Karni and Schmeidler (1990) for social influences on taste; and Peleg and Yaari (1973), Hammond (1976), and Gul and Pesendorfer (2005) for general consideration of taste changes over time. Meanwhile, a large number of researchers in economics and marketing have considered the possibility that prices affect preferences: see Barucci and Gazzola (2010) for a recent survey. Some of this work discusses the microfoundations of behaviors leading to price-dependent utility – chiefly so-called “snob effects” and judging quality by price. See, for instance, Pollak (1977), Martin (1986), Putler (1992), and Bagwell and Bernheim (1996). See, also, Ireland (1994), who observes that, with respect to positional (“snob”) consumption, taxes may affect preferences. Finally, there is an emerging literature on preference uncertainty and preference learning with relevance to the design of experiments and valuation studies (see, e.g., Brown et al. 2008 and Kingsley and Brown 2010).

behavioral phenomena, and to begin to establish a framework for development of more effective policies and strategies vis-à-vis that range.

The rest of this paper is organized as follows. Section II offers evidence relating to the formation of attitudes and their role in economic behavior. Section III proposes a general-form utility function that incorporates attitude and embodies the observations of the preceding section. Section IV models the individual's decision-making problem using a specific version of the attitude-based utility and examines comparative statics. Section V applies the model to three decision-making contexts, demonstrating how an economic theory of attitudes can explain anomalous behavior and lead to improved policy recommendations. Section VI concludes.

II. Attitudes and Economic Behavior: Observations and Evidence

In this section I present each of the four major observations about attitudes and their relationship to economic behavior enumerated in the introduction (as **(i)**, **(ii)**, **(iii)**, and **(iv)**), along with corresponding supporting evidence from psychological research, marketing research, and “real life” examples.

- (i)** Attitudes toward actions affect expected payoffs from actions.

Framing effects. In a situation where two options a and b are offered, people may prefer option a to option b when the choice is elicited one way, but prefer option b to option a when the choice is elicited another way. For example, people react differently to

firms charging different prices for different services depending upon whether the lower price is called a discount or the higher price a surcharge (Rabin 1998). The evidence on framing effects indicates that wording and other aspects of the presentation of options affect people's attitudes toward their options and, consequently, their preferences over those options.

Placebo effects. When a person takes an inert "sugar" pill to remedy a medical condition, her symptoms may still improve if she believes the pill will make her better. More formally, the individual's attitude, based on the perception that the pill is authentic, has sufficient influence with regard to her expectations (i.e., expected payoffs from the action of taking the pill) that it actually alters the effect, or perceived effect, of the pill on her system.

Market "mirages". Nagler and Osgood (2006) examined factors related to the term of ownership of small ranch properties in Yavapai County, Arizona over a ten-year sample period. Due to the dry climate, vegetative "greenness" in a property was considered a highly desirable, premium quality in the local real estate market. The researchers measured this key characteristic using daily 1 km-pixel satellite images. What they observed was that transplant owners – people from out of state who were not familiar with long-term weather patterns in Yavapai based on their own direct observation – tended to hold their properties longer, all else being equal, if they were greener during the term of ownership relative to the historic mean.

The result was a “lemons” outcome – sellers delayed putting properties on the market – but one due to *perceived* asymmetric information rather than actual asymmetric information. Owners thought they knew more about their properties than other people, and out-of-state owners based their perceptions on their limited term of ownership of in-state properties. Nevertheless, these owners acted on their perceptions as if they were true. The study offers a unique illustration of the power of attitudes: while they alter agents’ expected payoffs from their actions, in so doing they may, moreover, alter the efficiency of the market mechanism. Independent of the actual distribution of information, attitudes based on its perceived distribution can create their own effects (e.g., “lemons” problems).

(ii) Attitudes may change with prices

Price as a reference point. Evidence suggests that consumers form a reference point for future judgments of the value of price offers based on current observations of prices and promotions. This implies that attitudes toward price offers vary with observed prices. For example, consistent price promotions may lower a consumer’s reference point, causing her to think of the low price as “reasonable,” whence a return to “normal” prices seems like a price hike (Kalyanaram and Winer 1995).

Price as an indicator/driver of quality. In addition to facing uncertainty over whether a given price provides a “good deal,” people often experience uncertainty about product quality. Consumers may react to this by basing quality judgments on observed

prices. Such behavior is arguably not irrational if supply and demand forces naturally lead to an ordering of products on a price scale whereby price and quality are strongly related (Scitovsky 1945). Evidence of behavior supports that consumers indeed base their beliefs about quality on observed prices, at least in certain circumstances or for certain quality dimensions (Rao and Monroe 1989, Brucks et al. 2000, West et al. 2002, Völckner and Hofmann 2007).

More remarkably, pricing has been shown to alter the actual efficacy of products; for example, consumers who pay a discounted price when purchasing an energy drink thought to increase mental acuity derive less actual benefit from the drink (i.e., they are able to solve fewer puzzles) than consumers purchasing the same beverage at its regular price (Shiv et al. 2005).

Veblen effects. In his classic book on the “leisure class,” Thorstein Veblen (1934) noted that in a competitive society people may try to achieve greater social status by consuming conspicuous goods and services that advertise their wealth. For this reason, higher-priced goods may enjoy a special position in consumer tastes as status advertisers. Anecdotal evidence indicates a positive effect of price on consumers’ attitudes with respect to luxury goods. In an article in *The Economist* cited by Bagwell and Bernheim (1996), a marketing manager is quoted as saying, “Our customers do not want to pay less. If we halved the price of all our products, we would double our sales for six months and then we would sell nothing.” The same article emphasizes that “[r]etailers can damage a glamorous good’s image by selling it too cheaply.”

Social norms. Prices may send subtle signals, telling people not just what to expect about the quality of offerings, but also what constitutes socially acceptable behavior with respect to those offerings. Consider, for example, the findings of a now-famous field study by Gneezi and Rustichini (2000a) conducted at a group of day-care centers. The centers faced a problem: a number of parents were arriving late to collect their children, forcing teachers to stay after closing time. Parents were urged not to arrive late, but no charge was imposed for doing so. The researchers introduced a monetary fine for late-coming parents and observed its effect: contrary to what intuition might suggest, the number of late-coming parents increased significantly.

One possible interpretation, suggested by the researchers, is that the parents changed their beliefs about, and consequently attitude toward, late pick-up after the fine was introduced. Previously, parents had viewed late pick-up somewhat adversely as taking advantage of the teachers' generosity. But the newly introduced fine was interpreted as a *price*, whence "picking up late" was transformed in parents' minds from "imposing" into "transacting an available service."

Crime and punishment. Increasing the severity of punishment for a crime – that is, the effective "price" of the crime – may affect a person's attitude toward the crime. This was reflected in some counterintuitive behaviors observed in a set of experiments (see, e.g., Freedman 1965). Two groups of children were told not to play with a desirable toy. One group was threatened with severe punishment and another with mild punishment for disobedience. The two groups were then left to play in a room containing the toy for a period of time. Several weeks later the children were again put in the room with the toy,

but this time the threat of punishment was withdrawn. Those previously threatened with the severe punishment were observed more likely to play with the toy than those threatened with only mild punishment.

A cognitive dissonance interpretation of these findings is that the children threatened with only minor punishment had to convince themselves that playing with the toy was not desirable in order to feel comfortable with their decision not to engage in this activity. The attitude change that followed from this process reduced the doubt the children felt about whether they had done the right thing. Meanwhile, those threatened with severe punishment were less uncertain about their decision not to play with the toy, had no need to increase their comfort level with that decision, and so did not change their attitudes (Dickens 1986).

An alternative explanation parallels the notion of price as an indicator of quality. The children, not having formed a firm opinion of the desirability of the toy at the start of the experiment, may have used punishment severity as a signal of the toy's desirability. Children faced with a severe punishment for disobedience came to believe the toy was really an excellent one – why else would the grown-ups need such a severe punishment to deter disobedience? Meanwhile, those faced with only minor punishment formed a less enthusiastic attitude toward the toy.

(iii) People may induce changes in others' attitudes.

Advertising. Despite controversy over this point in the economics literature (see, for example, Nelson 1974), evidence from marketing research indicates strongly that the

substance of advertising claims influences people's attitudes. A number of studies show that repeated exposure to advertisements increases subjects' belief in the claims made in the advertisements (Hawkins and Hoch 1992, Law et al. 1998, Hawkins et al. 2001). Another mechanism by which advertising works is through affect: if people like an ad, they will be more likely to develop positive attitudes toward the advertised product (Coulter 2005).

“Word-of-mouth” (WOM) communication. Direct communication from people one knows can have a strong effect on individuals' attitudes toward products (Laczniak et al. 2001). In fact, it is estimated that two-thirds of purchase decisions reflect WOM influence (Gladwell 2003). Simulated WOM in advertisements, including paid celebrity endorsements; “slice of life” commercials, such as the classic Palmolive dishwashing liquid spots featuring Madge the Manicurist; and the quoted results of surveys of expert opinion (for example, “4 out of 5 dentists surveyed recommend ...”) have also been shown to be highly effective at changing attitudes (see, for example, Areni et al. 2000 and Bush et al. 2004).

Political influences. Violent anti-government rhetoric in the media has been blamed for the bombing of the Murrah Federal Building in Oklahoma City by Timothy McVeigh⁹ and, at least initially, for the shooting of Congresswoman Gabrielle Giffords in Tucson in early 2011. The implication is that such rhetoric can whip up emotions and influence beliefs, creating anti-government attitudes, and leading potentially to disastrous behaviors.

⁹ See, for example, Blow (2009).

A very different example of political influences is proposed by Romer (1996), who suggests that politicians use so-called entitlement programs to manipulate the attitudes of voters. Specifically, they strive to create the perception that the benefits these programs offer are the voter's rightful property. Such attitudes may lead to anger at a politician who threatens to take the programs away, with people expressing their anger with their votes.

(iv) People may induce changes in their own attitudes.

The economic analysis of identity suggests that a person's perspectives are strongly connected to her sense of identity (Akerlof and Kranton 2000). I therefore distinguish two types of self-induced attitude change: changes that occur through a self-induced change in identity, and changes that occur independent of identity.¹⁰

The *first* set of examples provide evidence of attitude change *through* identity:

Group identification. When a person chooses membership in a group, she may also be choosing an identity and the attitudes that come with it. For example, when one joins an insurgent group, one does not only commit to being involved in a set of actions constituting an insurgency; one also adopts the identity of an insurgent. The decision itself creates and reinforces certain attitudes – antipathy toward the government, beliefs that one's cause is just, and so forth. Similarly, when a young person joins a street gang, he adopts the identity of a gang member and, in doing so, embraces the gang's "credo."

¹⁰ Akerlof and Kranton (2000) discuss how, in certain situations, an individual may exercise choice over her own identity; for example, a woman may choose to be a career working woman or a housewife.

In one relevant study, Conover (1984) explored the effect of group identification on political perspectives. She used data from the 1980 CPS National Election Study to evaluate the relationship of survey responses reflecting strength of identification with various groups to responses to questions reflecting certain political attitudes and issue positions. She found that relevant group identifications had a significant impact on political attitudes – for instance, voters who most strongly identified with being young placed relatively high priority on women’s issues and the environment, while those who most strongly self-identified as “business people” placed relatively greater emphasis on economic policy. Other studies have connected group identification with attitudes toward products and marketing strategies (for example, Madrigal 2001).

Resolutions and affirmations. Sometimes people make very explicit decisions to adopt a set of new attitudes. New Years’ resolutions, for instance, typically involve affirmations such as “I am going to be a new man.” Other people may follow the exhortations of magazines to “visualize the new you.” While these statements involve identity choice on the face of them, the essential consequence of each choice is an attendant set of attitudes – for example, the “new man” in the New Years’ resolution is probably adopting a new mental position on exercise or healthy eating.

Popular culture is, of course, rife with such self-betterment resolutions and affirmations. Consider, for example, Patti La Belle’s song “New Attitude,” and Andy Kaufman’s (in the character of Latka Gravas from the 1980s television show *Taxi*) mantra, “I am going to alter my lifestyle to fit the fast lane.”

Other identity-based examples. Movie characters provide us with numerous examples illustrating the intuition of how assuming an identity changes attitudes. The main characters in *Avatar*, *Dances with Wolves*, *Witness*, and *Being John Malkovich* all make conscious decisions to take on a completely new identity. In each case, the movie documents a major transition in the character's attitudes, largely unanticipated by the character. Other movies portray the unexpected effect on attitudes of a person's decision to take on a new job (as in *The Mighty Ducks*) or other role (such as caregiver to an ailing mother, as in *One True Thing*).

The *second* set of examples provide evidence of self-induced attitude change *independent of identity*:

Crime and punishment. Consider, again, the experiments discussed above involving children and admonitions not to play with a desirable toy. The children in these experiments clearly changed their attitudes, but without changing their identities. The attitude change illustrated may not have been conscious.

Cognitive dissonance. Individuals generally prefer to think of themselves as smart, nice people who would not do something consciously to harm themselves or others. Occasionally, one receives information that conflicts with such basic, ego-supporting beliefs. Consider a worker who realizes that his job at a chemical plant, in exposing him to toxic reagents, has been placing his health at risk on a daily basis. Or an

investor who, after taking the advice of an unscrupulous advisor, realizes he has been duped and has lost his life savings. What does the individual in these situations do?

While people placed in these situations sometimes change their actions, they also tend to modify their *beliefs* to make these more congruent with continued maintenance of ego-supporting cognitions (Akerlof and Dickens 1982). Thus, the worker in the chemical plant convinces himself that the reagents are not truly putting him at risk. The investor convinces himself that the investment advice really was sound and that he made a good decision to follow it. As in the crime and punishment case above, such attitude changes may not always be conscious ones.

A range of anomalous phenomena may reflect the attitude-changing effects of cognitive dissonance. For example, Light (2011) finds that, over a certain range, people increase their weekly work time if their average commute times are longer (that is, work becomes an “inferior good” with respect to discretionary time). This might be attributable to a need on the part of many long-haul commuters to justify their behavior so that the time spent commuting does not feel like a waste.

III. A Utility Function with Attitude

In this section, I specify a utility function that explicitly accounts for observations (i) through (iv). The motivation for doing this is not just realism, in view of the evidence presented in the last section; but, critically, that attitudes play an important role in explaining behavior.¹¹

¹¹ For psychological research evidence on this point, see Fishbein and Ajzen (1975), Ajzen and Fishbein (1980), Ajzen (1985), and Dabholkar (1994).

Consider, then, an economy with n goods. Assume a person's utility depends upon the quantity consumed of the n goods, x_1, \dots, x_N , but also on the person's attitude with respect to the goods, A_1, \dots, A_N . Define n -vectors $\mathbf{x} \equiv (x_1, \dots, x_N)$ and $\mathbf{A} \equiv (A_1, \dots, A_N)$; these allow the utility function to be specified as:

$$(1) \quad U = U(\mathbf{x}, \mathbf{A})$$

The representation of an attitude by a summary numeric value for each good is consistent with the multi-attribute attitude model employed in the social psychology and consumer marketing literatures. The model generally views the consumer's attitude with respect to an object as the *sum* of her beliefs about the object. Learning new positive information increases this sum, while negative information decreases it. One may therefore talk about an "increase in attitude" with respect to good i as resulting from the acquisition of new positive information or otherwise from the positive modification of existing beliefs. Similarly, the consumer could experience a "decrease in attitude."

One may trivially posit that marginal utilities with respect to quantities x_i and attitudes A_i are all nonnegative, and strictly positive for strictly positive increments to quantity and attitude on $x_i > 0, A_i > 0$. For example, an increase in attitude with respect to good i generally makes the consumer feel better about the quantity of i she is currently consuming. I will also assume that the *own* cross partials between quantities and attitudes are all positive, whence, say, an increase in attitude with respect to a good increases the contribution to utility of an incremental unit of that good. Conversely, an increase in the quantity consumed increases the impact on overall utility of having a more positive attitude. I will, however, impose an intuitive restriction that the *non-own* cross

partials are zero, that is, an increase in attitude for one good has no effect on the utility of incremental units for another. These assumptions collectively incorporate observation **(i)**.

I propose further that a person's attitude with respect to good i depends upon a vector of external influences τ_{Ei} and a vector of internal influences τ_{Ii} , to wit,

$$(2) \quad A_i = A_i(\tau_{Ei}, \tau_{Ii})$$

External influences could include various forms of information about good i , including its price, or information discretionarily provided by third parties. Thus, making A_i a function of τ_{Ei} incorporates observations **(ii)** and **(iii)**. Internal influences could include various psychological factors, including memories of past experiences with the good, as well as past attitudes.

In the simplest case, the individual chooses goods to maximize utility (1), taking \mathbf{A} as given. However, through τ_{Ii} , I explicitly allow for the possibility that attitude change is self-induced, either through direct choice or through choice of identity. Thus I explicitly incorporate observation **(iv)**. Note that these direct or indirect “choices” of attitudes may not be conscious ones, as discussed above. If they are not conscious, then the assumption that the individual takes \mathbf{A} as given is not a bad one.

IV. A Simple Model of Individual Decision-Making with Attitude

To understand the implications of an attitude-based utility function for individual behavior, firms' strategies, and public policy, let us now consider a model of individual (i.e., “consumer”) decision-making based on simple attitude-based utility specification that, in particular, gives a specific form to (2). I begin with the utility function (1) and

assume two goods (i.e., $N=2$). I posit that the consumer's attitude with respect to one of the goods i depends positively upon two scalar variables, the good's price p_i and a miscellaneous exogenous influencer of attitude, τ_i . The latter might be either internal or external, but either way exogenous, and therefore not at the consumer's discretion. (τ_i could, for example, represent an internally motivated reaction, such as a reaction to cognitive dissonance, if the consumer is not aware of it or her ability to control it.)

I therefore rewrite (1), incorporating our specific case of (2), as follows¹²:

$$(3) \quad U = U(x_1, x_2, A_1(p_1, \tau_1), A_2(p_2, \tau_2))$$

Note that, given my earlier assumption of zero non-own cross partials between quantities and attitudes, I am perforce imposing the restriction that a change in price of one commodity has no impact on the marginal utility of the other. Moreover, I will assume that (3) is concave on its domain $X = \{(\mathbf{x}, \mathbf{A}) \in \mathbb{R}^4 \mid \mathbf{x} > 0, \mathbf{A} > 0\}$.¹³

Let us begin by considering the effect of a change in the price of Good 1. Assume the consumer has income y to be spent exclusively on Good 1 and Good 2, such that $y = \mathbf{x} \cdot \mathbf{p}$, where $\mathbf{p} \equiv (p_1, p_2)$ are the prices of the goods. The consumer's problem is to choose quantities of the two goods to maximize her utility (3) subject to this income constraint, or

$$(4) \quad \max_{\mathbf{x}} U(\mathbf{x}, \mathbf{A}) \text{ s.t. } y = \mathbf{x} \cdot \mathbf{p}$$

¹² Kalman (1968) has previously introduced price into a utility function in a general specification. The present model differs in that I posit attitudes as playing a mediating role in the price-utility relationship. To analyze consumers' judgment of quality by price, Martin (1986) posits a model in which utility depends on expectations with respect to uncertain quality, which in turn depend on price. My model may be thought as generalizing Martin's conception in that I assume price to act through attitudes without restricting the notional basis for that assumption (e.g., to quality expectations).

¹³ In order to make utility comparisons in this context I adopt, as Kalman (1968) does implicitly, what Pollak (1977, p. 65) refers to as an "unconditional interpretation of the price dependent preference ordering." That is, the consumer's preferences are presumed not to be conditioned on price.

Kalman and Intriligator (1973) have proven the existence of a solution \mathbf{x}^* to this class of problems, therefore I may define the uncompensated (Marshallian) demand curve for both goods,

$$(5) \quad \mathbf{x}^*(\mathbf{p}, \mathbf{A}, y) \equiv \arg \max_{\mathbf{x}} U(\mathbf{x}, \mathbf{A}) \text{ s.t. } y = \mathbf{x} \cdot \mathbf{p}$$

the compensated demand curve,

$$(6) \quad \mathbf{h}(\mathbf{p}, \mathbf{A}, u) \equiv \arg \min_{\mathbf{x}} \mathbf{x} \cdot \mathbf{p} \text{ s.t. } U(\mathbf{x}, \mathbf{A}) = u$$

and the expenditure function,

$$(7) \quad e(\mathbf{p}, \mathbf{A}, u) \equiv \min_{\mathbf{x}} \mathbf{x} \cdot \mathbf{p} \text{ s.t. } U(\mathbf{x}, \mathbf{A}) = u$$

Define $u^* \equiv U(\mathbf{x}^*, \mathbf{A})$. Now, for Good 1, it is identically true that

$$h_1(\mathbf{p}, \mathbf{A}(\mathbf{p}), u^*) \equiv x_1(\mathbf{p}, \mathbf{A}(\mathbf{p}), e(\mathbf{p}, \mathbf{A}(\mathbf{p}), u^*))$$

Differentiating this identity with respect to p_1 yields

$$\begin{aligned} \frac{\partial h_1(\mathbf{p}, \mathbf{A}, u^*)}{\partial p_1} + \frac{\partial h_1(\mathbf{p}, \mathbf{A}, u^*)}{\partial A_1} \frac{\partial A_1(p_1)}{\partial p_1} &= \frac{\partial x_1(\mathbf{p}, \mathbf{A}, y)}{\partial p_1} \\ + \frac{\partial x_1(\mathbf{p}, \mathbf{A}, y)}{\partial y} \left(\frac{\partial e(\mathbf{p}, \mathbf{A}, u^*)}{\partial p_1} + \frac{\partial e(\mathbf{p}, \mathbf{A}, u^*)}{\partial A_1} \frac{\partial A_1(p_1)}{\partial p_1} \right) &+ \frac{\partial x_1(\mathbf{p}, \mathbf{A}, y)}{\partial A_1} \frac{\partial A_1(p_1)}{\partial p_1} \end{aligned}$$

Noting that $\partial e(\mathbf{p}, \mathbf{A}, u^*) / \partial p_1 = x_1^*$ and rearranging yields a modified Slutsky equation:

$$(8) \quad \begin{aligned} \frac{\partial x_1(\mathbf{p}, \mathbf{A}, y)}{\partial p_1} + \frac{\partial x_1(\mathbf{p}, \mathbf{A}, y)}{\partial A_1} \frac{\partial A_1(p_1)}{\partial p_1} &= \frac{\partial h_1(\mathbf{p}, \mathbf{A}, u^*)}{\partial p_1} - \frac{\partial x_1(\mathbf{p}, \mathbf{A}, y)}{\partial y} x_1^* \\ + \frac{\partial A_1(p_1)}{\partial p_1} \left[\frac{\partial h_1(\mathbf{p}, \mathbf{A}, u^*)}{\partial A_1} - \frac{\partial x_1(\mathbf{p}, \mathbf{A}, y)}{\partial y} \frac{\partial e(\mathbf{p}, \mathbf{A}, u^*)}{\partial A_1} \right] \end{aligned}$$

The first two terms on the right-hand side are the substitution and income effects of the price change, respectively. These are both negative for a normal good. The last term is new: let us call it the *attitudinal effect*, reflecting the effect of a change in price on

quantity through attitude. Note that this incorporates price-offsetting components of both substitution and income effects; this is consistent with Kalman's (1968) treatment of the generalized Slutsky equation, though in the present case the effects of price act through attitudes.

The bracketed part of the third term may be signed as unambiguously positive using comparative statics on the optimization problem in (6),¹⁴ but intuition may be gained from a graphical representation of a decrease in price, shown in Figure 1.

<INSERT FIGURE 1 ABOUT HERE>

The figure illustrates the effect of a drop in price for Good 1, from p_A to p_B . At price p_A , the consumer's beliefs are represented by the two dashed-line indifference curves, and the consumer's utility-maximizing market bundle is given by C. One can trace out the usual substitution effect and income effect of the price change to p_B as movement from market bundle C to D, and movement from D to E, respectively. But in response to the drop in price, the consumer experiences also a *decrease in attitude* with respect to Good 1. Consequently, the indifference curves become flatter at all market baskets, reflecting the decline in the marginal utility of Good 1 at all bundles, while the marginal utility of Good 2 remains constant. That is, the consumer would be willing to give up less Good 2 to get a unit of Good 1 than before the change in her attitude. The post-change indifference map is represented by the three solid-line curves shown in Figure 1.

The decrease in attitude has two main effects. First, the consumer's maximizing market bundle switches *along the same budget line* from E to F. This, in essence, constitutes a second substitution effect, and is represented by the first term inside the

¹⁴ See Appendix.

brackets in (8): the consumer substitutes away from the commodity for which the price dropped, because the drop in price decreases her attitude toward that commodity while her attitude toward the other commodity remains constant. This *attitudinal substitution effect* takes the opposite sign of the traditional substitution effect, that is, it is unambiguously positive. The second effect, not visible in the figure, is that the consumer obtains less utility at all market baskets than before, hence a utility loss from being at point F after the price drops relative to being at point F prior to the drop in price. I shall refer to this as the *attitudinal quasi-income effect*. The consumer does not experience a change in purchasing power from her change in attitude, thus the true income effect through attitude change is zero.¹⁵ However, the existing chosen market basket does yield a different amount of utility – in the case of a drop in price, an unambiguously reduced amount of utility – because the consumer’s attitude toward one of the commodities in her market basket has decreased.

Two important things may be noted about the attitudinal effect in relation to other component effects. First, though the attitudinal effect of a price decrease on the quantity of Good 1 consumed is unambiguously negative (and the corresponding effect on the quantity of Good 2 consumed positive), the *overall* effect of the price change on the quantity of Good 1 is ambiguous. The example given in the chart shows an overall increase from the drop in the price of Good 1, but this need not be the case. If the effect of the decrease in attitude on the marginal utility of Good 1 is great enough, the new maximizing bundle F could be to the left of C. Thus an increase (decrease) in price for Good 1 could result in an increase (decrease) in the quantity of Good 1 demanded when the attitudinal effect is taken into account. While Good 1 appears to be a Giffen good, it

¹⁵ See Appendix.

is not: it is in fact a normal good. Nevertheless, the positive attitudinal effect may be large enough to swamp both the negative substitution and income effects.

Second, the decrease in attitude causes an unambiguous decline in the utility the consumer obtains. The proof of this is simple: E is preferred to F prior to the decrease in attitude, and F conveys more utility prior to the decrease in attitude than it does after, therefore the consumer is better off at E before than she is at F after. Interestingly, the *overall* effect of the price change on utility is ambiguous. One cannot judge from the figure whether or not point F conveys more utility after the decrease in attitude than did point C before the decrease. *However*, if the effect of the decrease in attitude on the marginal utility of Good 1 is great enough, the new maximizing bundle F could be to the left of the indifference curve on which C lies. If so, then C before the decrease would clearly be preferred to F after it. The decline in the price of Good 1 would correspond to an unambiguous *decline* in the consumer's utility.

Now briefly consider the effect of an exogenous change in attitudes for one of the goods – say, Good 1 – represented by a shift in τ_1 . The external factor does not enter the consumer's budget constraint, so there are no traditional income or substitution effects. An exogenous decrease in attitudes (expressed, without loss of generality, by a decrease in τ_1) has, analogous to the attitudinal effect component of a price decrease, two effects. First, there is an attitudinal substitution effect, that is, a decrease in the slope of indifference curves at all points, causing the consumer's chosen market basket to move along the current budget constraint to a point consisting of more of Good 2 and less of Good 1 (in the figure, E to F). Second, there is an attitudinal quasi-income effect, that is,

a decrease in utility at all points, and therefore less utility is received at point F than prior to the attitude change.

V. Applications of the Attitude Model

I now apply the model to three different decision-making contexts for the purpose of developing behavioral insights and making policy recommendations. These contexts, while diverse, all fit the model's scope in that they involve either changes in attitudes precipitated by changes in the price (or, more generally, perceived incurred cost) of engaging in an activity or else other exogenous changes in attitudes. In each case, I examine traditional policy responses and discuss how incorporating an understanding of attitudes into the policy process could lead to more effective approaches. In two of the three cases considered, the traditional policy approaches ignore attitudes outright; that is, they presume that the only effects of policies are direct effects on agents' incentives to engage in behaviors. In the third case, while the traditional policy approach is to foster attitude change, I argue that a fuller understanding of the role of attitudes could lead to improvements in policy effectiveness.

A. Motivating People¹⁶

A number of researchers have found odd results, from the perspective of traditional economics, with respect to motivation. It seems that, at least in certain

¹⁶ One may reasonably view the other two cases – fighting terrorism and fighting the spread of HIV/AIDS – as nested special cases of the general problem, discussed in this first subsection, of motivating people.

situations, giving people a greater monetary reward to perform an action may actually decrease performance. And, sometimes, people given no reward perform very well. Gneezi and Rustichini's (2000a) study of day-care centers, discussed in Section III, provides one illustration.

Another study performed by the same authors provides a different sort of illustration (Gneezi and Rustichini 2000b). The researchers paid students from the University of Haifa 60 New Israeli Shekels (NIS) – approximately US\$17 – to participate in an experiment in which they answered questions taken from an IQ test. The students were divided into four groups. The first group was not promised any additional compensation. The second group was promised an additional 10 cents of a NIS for each correct answer on the test. The third group was promised 1 NIS and the fourth group 3 NIS per correct answer. The authors found that the average number of correct answers dropped from 28 in the first group to 23 in the second. Meanwhile, the third and fourth groups averaged 34 correct answers each. These findings, which were reinforced by the results of a separate experiment performed as part of the same study, demonstrate that while monetary incentives may improve performance, the effect is not monotonic. In other words, there is some range over which increasing compensation decreases performance.¹⁷

Other examples from “real life” relating motivation and rewards are similarly unexpected. Tens of thousands of people write and edit articles for the online encyclopedia Wikipedia without being paid. People take vacations in which they pay,

¹⁷ Other studies indicating an adverse effect of incentives on performance include Deci (1971), Deci (1972), and Lepper et al. (1973).

rather than expecting to be paid, for the privilege of working at another job. And academic economists continue to do research and publish after getting tenure!¹⁸

1. Applying the model

Traditional economic policies toward motivation advise the use of direct incentives – additional payment for activities one seeks to motivate and additional penalties for activities one seeks to extinguish. Under such policy regimes, incentive adjustment is achieved by what amount to prices. An increased penalty for picking one’s child late is expected to reduce the incidence of lateness because, in a pure market context, it is the price of lateness. An increased wage is expected to increase effort devoted to the job because, in a pure market context, it is the price of effort. Rational individuals are expected to respond to prices in accordance with the law of demand.

However, an indirect effect though attitudes is ignored. In both cases, the activity in question is not just a pure market activity, but a *bundle* of a market activity with an attitude-sensitive non-market activity. Work bundles effort – a market activity, that is, something unpleasant for which one would like to be compensated – with pleasurable involvement. Picking up one’s child late from day care bundles a desirable convenience service – a market activity for which one might pay – with the guilt of imposing on the day care providers when it is “wrong” to do so. An increase in price has the expected direct incentive effect on the market component, but it also *unbundles* the attitude-sensitive non-market component. In the parlance of the motivation literature, extrinsic motivation (i.e., via incentive payments and systems) crowds out intrinsic motivation.

¹⁸ For a discussion of additional examples, see Pink (2009).

Consider, first, the day care case. Recall that Gneezi and Rustichini (2000a) surmised that parents viewed the fine as a price. In essence, the fine constituted an invitation to pay for lateness, unbundled from the shame and guilt of lateness. Thus, with the imposition of the fine, parents experienced an *increase in attitude* toward being late – it became something more desirable than before. This effect is illustrated in Figure 2. Here, Good 1 would represent being late to pick up one’s child. The indifference map prior to the increase in attitude toward Good 1 is represented by the dashed-line curves, while the steeper solid-line curves represent the post-attitude-change indifference map. The normal consumer analysis suggests that an increase in the price of lateness reduces consumption of lateness, causing the consumer to substitute toward other goods (movement from C to E). But the increase in attitude operates in the other direction: the attitudinal effect of the price change causes substitution toward lateness and away from other goods (E to F). It also causes an overall increase in utility in that the amount of lateness currently consumed by the individual brings greater utility once it has been unbundled from guilt and shame.

<INSERT FIGURE 2 ABOUT HERE>

Now consider the labor market scenario. The manager’s problem is to induce workers to devote additional effort to the job. Let us set aside the more complex efficiency wage analysis and focus on the simplest explication, in which the labor market clears. For this case, the textbook analysis of an increase in wage makes use of the standard consumer analysis of indifference curves and budget lines.¹⁹ Consider Figure 1, and let Good 1 be income and Good 2 be leisure. An increase in the wage is represented as a decrease in the price of income. This has the usual substitution and income effects.

¹⁹ See, for example, Pindyck and Rubinfeld (2009), pp. 531-533.

The substitution effect induces a switch (from C to D) whereby the consumer chooses less leisure and more income. The income effect allows the consumer to move to a higher indifference curve (from D to E); this may result in greater amounts of both income and leisure, or more of one and less of the other, depending upon whether leisure and income are both normal goods or one is an inferior good. As drawn in the figure, both are normal goods, and overall the increase in wage causes the worker to choose a lot more income and a lot less leisure.

Of course, in the traditional analysis, it does not always go this way: even when income is a normal good, if the substitution effect is small enough, an increase in the wage may induce an decrease in the amount of work time; that is, there may be a backward-bending supply curve for labor. But, even so, unless income is a Giffen good, one can rely on the worker increasing the amount of income she takes in equilibrium when the wage increases.

But now, suppose that an increase in wage causes a decrease in attitude toward the work. In other words, suppose it causes the pleasure of the work to be unbundled from the job so that only the “chore” aspect remains. The shift from E to F in Figure 1 illustrates the attitudinal effect of the wage change. This effect results in substitution toward leisure and away from income. It also results in an overall decrease in utility, in that the amount of work currently consumed by the individual brings less utility once it has been unbundled from the pleasure of working.

As drawn in the figure, the end result is more leisure (less work), and a little more income for the worker – analogous to the traditional analysis for a backward-bending supply curve for labor. But if the attitudinal effect is strong enough, and the worker’s

newfound repugnance for the work great enough (such that F is to the left of C), then the wage increase could actually cause the worker to choose to earn less income than before. Consistent with the discussion in Section IV, this “quasi-Giffen” outcome may be consistent with income being a normal good in the analysis.

2. A policy based on attitudes

As the preceding analysis suggests, policies that attempt to use extrinsic motivation to influence behaviors directly may be counterproductive in that they tend to crowd out intrinsic motivation. Alternative motivational policies that work through attitudes rather than directly on behaviors may hold greater promise. A manager might, for example, provide positive feedback and try to empower her workers by giving them more discretion in their jobs in order to increase productivity. These actions, if executed competently, would tend to foster positive beliefs and feelings, causing workers to experience an increase in attitude with respect to their jobs. This could result in more effort with no increase in monetary compensation. The central tenet of these and similar policies is the nurturing of intrinsic motivation.

Meanwhile, rather than imposing a fine, the owner of the day-care center in Gneezi and Rustichini’s (2000a) study should employ “moral suasion” to bring parents to comply with the request for on-time pickup, attempting to nurture the parent’s intrinsic motivation to behave in the desired manner. That is, she should essentially engage in a marketing campaign – using flyers, emails, and direct personal communications – to change parents’ beliefs and feelings with respect to compliance. In the end, the campaign must convince parents that picking up on time is right thing to do. Since different parents

have different personalities and will respond to different messages in this regard, such a policy must of course be pursued thoughtfully. In the model, such a policy consists of attempting to decrease parents' attitudes with respect to lateness.

B. Fighting Terrorism

Since September 11, 2001, a major focus of foreign policy in the United States and other Western countries has been a reduction in the risk of terrorist attacks. Counterterrorism policies have consisted of two main types: passive policies, such as erecting technological barriers, securing borders, fortifying targets, and instituting stiffer penalties for terrorists; and active policies, such as retaliatory raids, preemptive strikes, destroying terrorist training camps, and freezing terrorist assets (Enders and Sandler 1995, Sandler and Arce 2007). In general, these policies focus on the benefits and costs of terrorist actions, that is, they seek to reduce the benefits of terrorism while increasing its costs.

Most economic analysis has focused on these policy approaches (Sandler and Arce 2007). While some economists have advanced innovative proposals, these have tended, similarly, to focus on direct incentives (Frey and Luechinger 2002, 2004). Although billions of dollars have been spent on anti-terrorism policies in the U.S. over the past 10 years, authorities report that the risk of attacks remains as high as it has ever been.²⁰

1. Applying the model

²⁰ See, for example, Schmitt (2011).

If, indeed, counterterrorism policies focused on the benefits and costs of engaging in terrorism have been ineffective, or less effective than anticipated, one may attribute this to a failure to account for the role of the agents' attitudes. Consider, in the context of the model, a policy action that is intended to increase the cost of terrorist activity, whether a passive policy (e.g., fortifying targets, stiffer penalties) or active policy (e.g., retaliatory raids, preemptive strikes). Such a policy might be viewed as increasing the "price" of terrorism relative to other activities.

Figure 2 illustrates. Let Good 1 represent terrorist activity and Good 2 a composite of all other activities open to the prospective terrorist agent. The standard analysis of a price increase suggests that cost-focused policy will generally reduce the incidence of terrorism. The substitution effect reflects the agent's tendency to decrease engagement in terrorism while substituting engagement in other activities when the cost of engaging in terrorism increases. The income effect indicates the tendency of counterterrorism measures generally to depress all activity by targeted agents.²¹ While it is not inconceivable that terrorism is an inferior good,²² the overall effect of the proposed policy still would be to reduce terrorist activity, except in a Giffen good case.

But this analysis ignores the effect of the policy on attitudes. Overt counterterrorist policies may increase, among the targeted groups, a sense that the government engaging in the policy actions is malevolent, while simultaneously strengthening the oppositional identity of those groups. It may thus change the agent's

²¹ For example, if one is struggling harder to overcome a technological barrier in order to commit a terrorist act, one must commit more resources to the act, such that one's real income is reduced, hence the consumption of all goods and activities is reduced.

²² While intuition tends to suggest a connection between poverty and terrorist activity, exploratory economic analyses have largely rejected such a connection. See, for example, Krueger and Maleckova (2003).

frame of reference on the prospective target of the terrorist act and on the act itself, making the act appear more attractive. Again, consider Figure 2. In addition to substitution and income effects, the policy that increases the “price” of terrorism has an attitudinal effect: it causes targeted agents to experience an increase in attitude toward terrorist activity. The increased desirability of terrorist acts is represented by a steepening of the indifference curves, so that the agent chooses a higher level of terrorist activity (movement from E to F). Another interesting outcome of the analysis in the context of our model is the attitudinal quasi-income effect: the increase in the price of terrorism increases utility for the agent at all points. The counterterrorist policy may be thought of as creating a certain pride to being a terrorist, thereby increasing the utility of terrorists across all market baskets. The net effect is that the counterterrorist policy results in a smaller reduction in terrorist activity than the traditional analysis suggests. In fact, it is possible, depending upon the intensity of the attitudinal effect, that the policy might increase the incidence of terrorism.

The sort of counterterrorism policy I have considered here is similar to a general class of repression policies that might be used by a government to suppress an activity by a dissident group. For example, a government that wishes to stop a minority religious group from practicing its religion, or an insurgent group from organizing, might commonly employ policies aimed at increasing the costs of these activities. The attitude analysis just presented demonstrates generally why repression policies often fail: they have indirect effects on behaviors through agent-group attitudes that run counter to their intended effects.

2. A policy based on attitudes

An alternative policy, relying on attitudes, takes a very different tack. Rather than emphasizing direct incentive measures against terrorist behaviors, such a policy might focus on changing beliefs and feelings toward the principal's group so as to weaken the oppositional identity of the agent group. Essentially, the principal must engage in an attitude-change marketing campaign (Rothschild 1978). This, if successful, would decrease returns to terrorist activity.²³ The key question with respect to any such attempt "to win hearts and minds" is whether, in a particular situation, there really exists the potential for changing the attitudes of the would-be terrorists. How hardened are agent attitudes with respect to the principal? How likely is that such a campaign would be received cynically and, therefore, be rendered ineffective? The psychological literature notes that audience susceptibility to a message is a function of the audience's perception of the credibility of the message source.²⁴ Any successful campaign would therefore have to take pains and invest substantial time to build credibility with the target audience.

C. Fighting the Spread of HIV/AIDS

HIV/AIDS continues to constitute one of the most serious public health problems worldwide, with about 0.5% of the world's population currently infected and nearly 2 million deaths attributable to the disease per year (UNAIDS, 2010). Perhaps the most important factor in saving lives is preventing the spread of the disease, and critical to this effort is ensuring that people at risk get tested for HIV. Individuals who know they are

²³ For a discussion of this kind of strategy, see, for example, Howard (2002).

²⁴ See, for example, Wu and Shaffer (1987).

infected may take special steps to ensure they do not infect others. Yet there remain many obstacles to widespread testing, not least of which is that people who should get tested sometimes choose not to. Often, the problem is that people are afraid to find out that they might be infected. While such fear is understandable, the benefits of knowing one is infected are great, not just for society but for the individual. HIV-infected people now have broad access to therapies that extend the length and quality of life; in many cases these may delay, perhaps indefinitely, one's experiencing most or all of the symptoms associated with AIDS.

1. Applying the model

One major "irrational" factor behind the decision not to get HIV tested is cognitive dissonance (Offir et al. 1993, Mikolajczak et al. 2006). Again, Figure 1 illustrates the application of the attitudes model. Let Good 1 represent an individual's "effort" devoted to HIV testing and Good 2 effort devoted to all other activities. Consider an individual who does not believe she is at risk for HIV/AIDS. Perhaps she has never heard of the disease, or perhaps she thinks it only affects people in a different demographic group than she, or people on a different continent. Given this set of beliefs, the individual rationally chooses to devote very little effort to getting tested. She might, therefore, be positioned at point F in the figure.

Now suppose this individual receives new information indicating that she is at substantial risk for HIV infection, such that she would personally benefit much more from getting tested than someone with the initial set of risk-related beliefs would have perceived. Assuming this new information is the only shock to attitudes, it has the effect

of making the individual's indifference curves steeper, so that she would be more willing to trade effort from other activities toward HIV testing. As a consequence, the individual would move to point E and would very likely get tested. The individual has experienced an increase in attitude toward HIV testing.

Many people would prefer not to accept the state of the world into which this new information places them, however, if given the choice. The information that one is at risk of having a life-threatening disease is frightening and unsettling. Moreover, one may face the unpleasant perception that one has been at risk for a while but was "too stupid to realize it." A person might thus react to the new risk-related information by modifying her beliefs to reduce discomfort and dislocation. She may tell herself that she is not in fact at risk, "despite what they say." Such a reaction to cognitive dissonance is reflected in Figure 1 by a shift back along the budget line toward F – perhaps all the way back to F if the person reverses the change in attitudes completely in order to restore her equilibrium.

A similar analysis can be applied to other situations involving cognitive dissonance. Consider, for example, a consumer who has been taken in by deceptive advertising and accordingly purchases a product that she otherwise would not have chosen. Later she is presented with information that reveals the deception. Rather than allow herself to experience a decrease in attitude toward the product and feel that she is "stupid," she may ignore or dilute the information to restore her original frame of reference. In essence, she has restored her equilibrium – and chosen to remain deceived (Nagler 1993).

2. A policy based on attitudes

Public health policy problems such as HIV testing, child immunization, smoking, use of contraceptives, spaying and neutering pets, the wearing of motorcycle helmets, and so forth, constitute one arena in which the traditional policy approach *is* to influence attitudes. Typically, policy makers employ an information campaign, using advertising and outreach, to educate affected people about the importance of taking the action in question. But the challenge with many of these problems is that the agent is generating her own attitudinal “reaction” to new information, creating offsetting or buffering changes in beliefs in an attempt to restore equilibrium. In essence, the agent is *allergic* to the policy being implemented. Each new information shock may be absorbed in a similar fashion to the initial dissonance-producing information shock. For example, a hardened smoker simply tunes out successive anti-smoking messages.

Effective policy must recognize the potential for an allergic reaction. Here, classical conditioning – instruments aimed at shifting affect instead of beliefs – may help. If the agent can get comfortable with the true beliefs set, she may be more willing to adopt behavioral changes.

VI. Concluding Discussion: Relativity in Economics

This paper has introduced attitudes into economic analysis. It has done so by positing a utility function extended with attitude. The utility function was incorporated into a model of individual decision-making to examine the equilibrium outcomes resulting from a change in price and a miscellaneous exogenous attitude change. This

small extension to economic theory was motivated by the recognition that, in general, the economic agent has a variable relationship with the object of her actions. As my attitude-based analysis of terrorism, HIV testing, and the economics of motivation all demonstrate, one must explicitly account for the agent's frame of reference on the action-object if one is to make accurate predictions of behavior and appropriate policy recommendations.

The analysis in this paper has provided a demonstration of a larger concept: the role relativity plays in economic behavior. A relativistic perspective has found its way into a number of areas of behavioral analysis. O'Donoghue and Rabin (1999) propose that individual preferences are time-inconsistent, recognizing the role that the particular vantage point in time plays in intertemporal preference. Koszegi and Rabin (2007), building on the foundations of prospect theory (Kahneman and Tversky 1979), develop a theory of reference-dependent preferences, indicating that time is not the only continuum on which the decision-maker's location is relevant to the outcome. Traditional economics has suggested that, in general, such things should not matter much. Likewise, traditional economics has preferred to view the decision-maker's perspective as unchanging relative to the economic forces that one seeks to examine. This paper and other recent work have demonstrated that more realistic assumptions may be parsimoniously introduced into economic modeling to obtain predictions that are significantly more realistic with respect to an economic landscape that is not fixed in time or space.

This paper's contribution has been a small step, and there is still much to be done in exploring the economic implications of attitudes. One important next step is empirical

validation. It is well recognized by psychologists that attitudes are measurable.²⁵ Measurements of attitude could be incorporated into hedonic analysis to account for their impact on utility. It might be possible, then, to account for my hypothesized attitudinal effect of a change in prices using instrumental variable techniques. Another important contribution would be to analyze the welfare impacts of attitude choice and policy applications incorporating attitude change. Such an analysis would need to account for the existing welfare-analytic literature relating to changing tastes and price-dependent preferences (e.g., Pollak 1977, 1978; Marschak 1978; Dixit and Norman 1978; Ireland 1994; and Becker 1996) and the relativity-based measurement issues this literature raises.²⁶ A third contribution might involve dynamic modeling of attitude change. Such a model should, in particular, incorporate identity and identity change as relevant factors.

Appendix: Signing the Attitudinal Effect

The bracketed expression in (8) is

$$\frac{\partial h_1(\mathbf{p}, \mathbf{A}, u^*)}{\partial A_1} - \frac{\partial x_1(\mathbf{p}, \mathbf{A}, y^*)}{\partial y} \frac{\partial e(\mathbf{p}, \mathbf{A}, u^*)}{\partial A_1}$$

The second term is equal to zero; this follows from the envelope theorem, because the derivative of the expenditure function with respect to attitudes is evaluated holding the market basket constant at its optimal value. The first term may be signed by comparative statics. First, we write the Lagrangian associated with (6) and take the first-order conditions:

²⁵ See, for example, Summers (1970).

²⁶ Traditional consumer surplus-based welfare measures are conditioned on preferences, hence the welfare impacts of taste-changing events and policies pose special problems and require special treatment.

$$\begin{aligned}
L &\equiv \mathbf{x} \cdot \mathbf{p} + \lambda(U(\mathbf{x}, \mathbf{A}) - u) \\
\Rightarrow p_1 + \lambda \frac{\partial U}{\partial x_1} &= 0, p_2 + \lambda \frac{\partial U}{\partial x_2} = 0, U(\mathbf{x}, \mathbf{A}) = u
\end{aligned} \tag{A1}$$

Totally differentiating (A1) obtains

$$\begin{aligned}
\lambda \frac{\partial^2 U}{\partial x_1^2} dx_1 + \frac{\partial U}{\partial x_1} d\lambda &= -\lambda \frac{\partial^2 U}{\partial x_1 \partial A_1} dA_1 \\
\lambda \frac{\partial^2 U}{\partial x_2^2} dx_2 + \frac{\partial U}{\partial x_2} d\lambda &= -\lambda \frac{\partial^2 U}{\partial x_2 \partial A_2} dA_2 \\
\frac{\partial U}{\partial x_1} dx_1 + \frac{\partial U}{\partial x_2} dx_2 &= -\frac{\partial U}{\partial A_1} dA_1 - \frac{\partial U}{\partial A_2} dA_2
\end{aligned} \tag{A2}$$

The bordered Hessian associated with the minimization is

$$\begin{bmatrix} \frac{\partial^2 U}{\partial x_1^2} & 0 & \frac{\partial U}{\partial x_1} \\ 0 & \frac{\partial^2 U}{\partial x_2^2} & \frac{\partial U}{\partial x_2} \\ \frac{\partial U}{\partial x_1} & \frac{\partial U}{\partial x_2} & 0 \end{bmatrix} \tag{A3}$$

And, using Cramer's rule, one can write

$$\frac{\partial h_1}{\partial A_1} = \frac{1}{|H|} \begin{vmatrix} -\lambda \frac{\partial^2 U}{\partial x_1 \partial A_1} & 0 & \frac{\partial U}{\partial x_1} \\ 0 & \frac{\partial^2 U}{\partial x_2^2} & \frac{\partial U}{\partial x_2} \\ -\frac{\partial U}{\partial A_1} & \frac{\partial U}{\partial x_2} & 0 \end{vmatrix} = \frac{1}{|H|} \left[\lambda \frac{\partial^2 U}{\partial x_1 \partial A_1} \left(\frac{\partial U}{\partial x_2} \right)^2 + \frac{\partial U}{\partial A_1} \frac{\partial U}{\partial x_1} \frac{\partial^2 U}{\partial x_2^2} \right] > 0 \tag{A4}$$

I am able to sign the expression unambiguously: $|H| < 0$, by the second-order condition

of a minimum; $\lambda < 0$, as the effect of relaxing the utility constraint is to reduce

expenditure; $\frac{\partial U}{\partial x_1} > 0$, $\frac{\partial U}{\partial x_2} > 0$, and $\frac{\partial^2 U}{\partial x_1 \partial A_1} > 0$ by assumption; and $\frac{\partial^2 U}{\partial x_2^2} < 0$ due to

diminishing marginal utility. Intuitively, an increase in attitude with respect to a good increases the quantity of that good in the optimizing market bundle. Thus, the attitudinal effect is positive.

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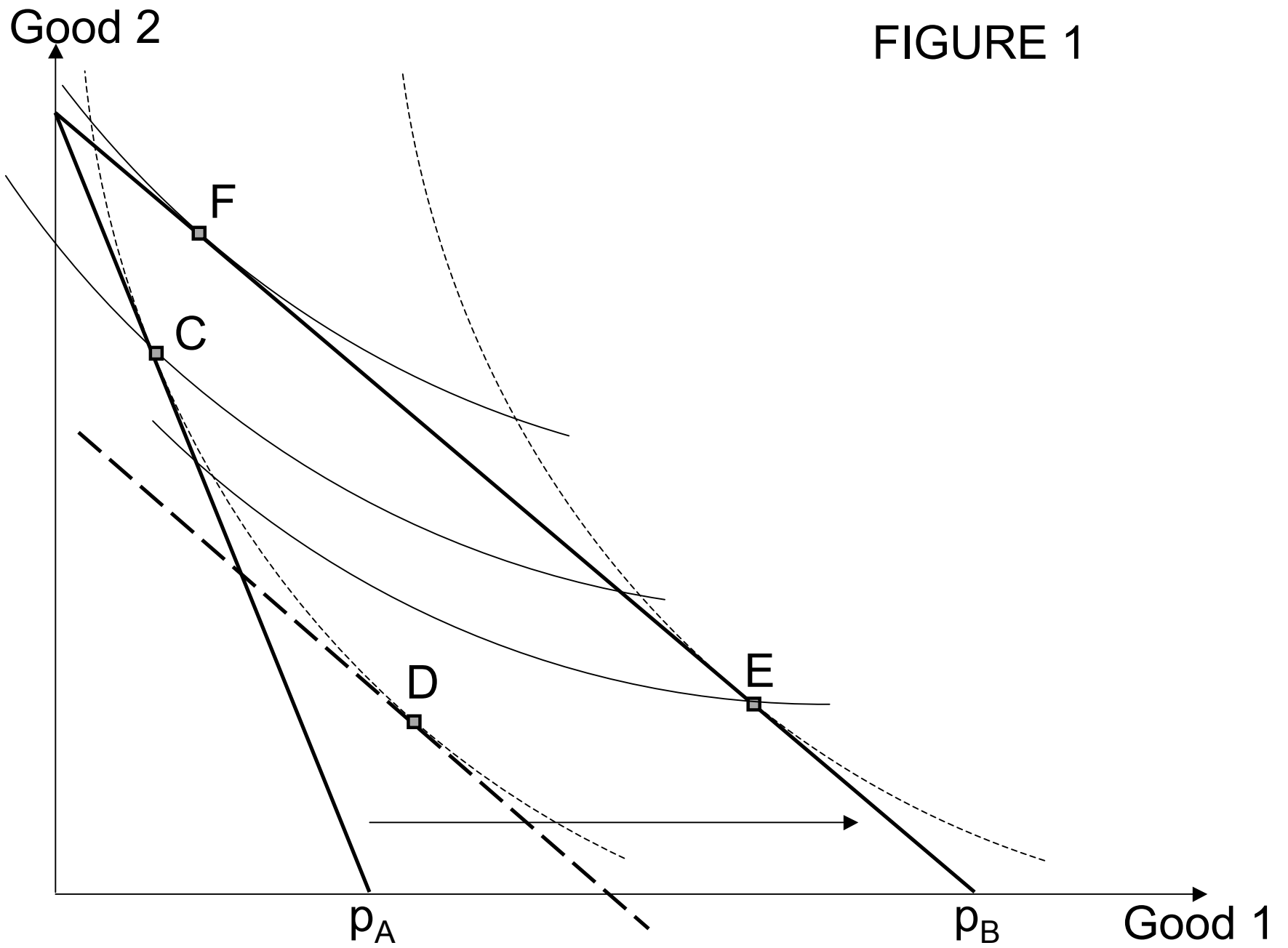
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FIGURE 1



Good 2

FIGURE 2

