Opening-up the objective function: choice behavior and economic and non-economic variables—core and marginal altruism

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Abstract

A revised model of the preference function is presented incorporating utility maximizing acts of material self-sacrifice. This model incorporates neoclassical and behavioral arguments, allowing for the stylized fact that economic agents are motivated by both material and non-material incentives. Given such a preference function, choice behavior is modeled as a function of relative opportunity costs (price) and real income. Preferences are determined by a variety of variables inclusive of social capital and education. There is therefore a core preference based upon non-economic variables and a 'marginal' component which is a function of conventional economic variables. The relative importance of these two components in determinating choice behavior is an empirical question. Building upon conventional tools, a demand curve for moral acts is derived and underlying income and substitution effects discussed. Empirical evidence from the tipping literature is used to illustrate the model.

1. Introduction

There is now much debate and discussion on the extent to which the conventional material selfish maximizing objective function is an appropriate normative and causative analytical tool in the domain of individual behavior. In particular, the reasonableness of the conventional model has been challenged by behavioral economists and economic psychologists. It is argued that there is much evidence for materially self-sacrificing behavior which is inconsistent with the modeling framework which assumes that rational agents do not and should not behave in this fashion. For example, results from ultimatum and dictator games are presented in support of this argument as is evidence from the tipping literature.

The evidence of apparently aberrant behavior suggests to some behavioral economics and economic psychologists that either economic agents are not rational or are quasi-rational and that the conventional modeling of individual utility maximizing behavior is mis-specified and needs revising (Frank 1988, 1996; Khaneman, Knetch, Thaler 1986a, 1986b). On the other hand, from the perspective of Simon (1959, 1978, 1987) and more recently, Smith (2003, 2005), leading proponents of behavioral economics, economic theory needs to be embedded in a revised theoretical framework built upon assumptions which are consistent with evidence yielding analytical predictions which are also consistent with the evidence. Such a theory should be consistent with intelligent behavior albeit behavior that often deviates from neoclassical norms. The latter notion is consistent with ecological rationality wherein it is expected that individuals behave in a fashion consistent the realization of their preference and their survival given the various constraints which they face inclusive of cognitive ones (Goldstein and Gigerenzer 2002; Smith 2005).

I present a model of intelligent-cum-rational behavior that is consistent with the evidence and which therefore incorporates both altruistic, warm glow, and social norm determinants of behavioral as well the traditional opportunity cost and real income causative variable championed in the mainstream economics literature. This modeling framework builds upon Becker's (1996) recent revisions to the modeling of individual behavior and the modeling framework developed in Altman (2005a, 2005b). I argue that rational agents whose behaviors are not subject to market forces can be expected to behave in a fashion which is consistent with both behavioralist and neoclassical arguments. This theoretical framework does not apply to firm behavior (to that of economic agents making choices within the firm) wherein individual choice can affect unit costs and profits.[1]

2. A Simple Modeling Framework

For Becker (1996, p.23) individuals are modeled as rational utility maximizers in the sense that they are assumed to: "…make forward-looking maximizing, and consistent choices." What individuals maximize is rather beside the point. In other words, an individual's utility might very well be maximized in terms of altruistic, moralistic, ethical behavior, or indeed in terms of extreme self-serving and materialistic oriented behavior.[2] What counts in Becker's analytical framework is that

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[1] Altman (2001a, 2001b, 2005) develops this point and building upon a x-efficiency/efficiency wage modeling framework it is argued that the existence effort discretion and endogenous technological change induced by moral acts (which imposes on the firm), yields cost offsets to moral acts inside the firm creating a space for such behavior even in a competitive market economy. See also, Tomer (1997).

[2] A similar point was decades ago in Hayek (1948).

individuals are rational given their objectives and the constraints which they face when engaging in the decision making process. Although this framework is consistent with the typical assumptions made by economists that utility maximizing behavior is dominated by pure self-interest, it does not exclude behavior that is dominated by the moral dimension which includes various levels of reciprocity. Self-interest rationality is here a subset of possible rational behavioral choices afforded to individuals. I assume that maximization here refers to individuals doing the best they can given the constraints which they face. Rational individuals are not expected to maximize in the traditional neoclassical fashion.[3]

A Becker style utility function can be written as follows:

1. $U = f(Q, NM, E)$,

where U is utility, Q is output or real income, NM is non-market time inclusive of leisure and non-market work, and E is altruistic, ethical, or moral behavior. Q, NM, and E yield utility in terms of the services that they generate to the individual. Utility is maximized subject to the budget constraint of the economic agent. In this model, more of E comes at the cost of the reduction in Q and NM necessary to increase E. Therefore, there is a trade-off between Q, NM, and E. In other words, behavior that is altruistic, moral, or ethical is not a free ride with respect to income. There is an opportunity cost involved. A central message of economic theory, including that of open-ended economic theory, which allows for the moral dimension, is that one must make explicit the extent of the cost to the individual, and to society when externalities are involved, of engaging in non-egotistic behavior. Eliminating E from consideration does not bias economic analyses if E represents anomalous behavior. But the interjection of E is required to explain anomalous behavior, more common economic behavior that is dominated by the moral dimension, or differential behavior that is determined by individuals assigning differential weights to the moral dimension in their respective utility function.[4]

It is assumed that the individual is a utility maximizer in the Beckerian sense specified above. In terms of indifference curve analysis, the individual is expected to behave in a fashion consistent the tangency of the indifference curve, which incorporates altruism, and the budget constraint reflecting opportunity costs and real income.

I also assume that the individual has a target income which need be realized as a prior to engaging in moral acts and this target income consists of a physiological target at its core and an additional one determined by sociological-psychological variables. Ceteris paribus, as target income increases, the quantum of moral acts diminishes. To the extent that moral acts comprise a normal good, increasing real income can be expected increase the number of moral acts. Given real income and holding preferences constant the equilibrium quantity of moral acts is also determined by

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[3] Following Gegerenzer (2000), one can argue that non-neoclassical maximizing exercises can be Pareto superior to neoclassical maximizing given that individuals are not wired to behave neoclassically.
[4] The analysis becomes more complex if ethical behavioral contributes to making the individual more productive and thus offsets in part or completely any negative impact on income which ethical behavior might otherwise have. However, in terms of analyzing the realm of consumption, the simplifying assumption of ethical behavior being neutral in terms of affecting income is a legitimate one. See Altman (2005) on the possible productivity enhancing effects of ethical behavior.

opportunity costs. One would expect that moral acts tend to be more pervasive the lower their costs and, ceteris paribus, for there to be a negative relationship between the quantity of moral acts supplied and the related opportunity costs. Thus, on the margin (marginal moral acts), the demand for moral acts can be expected to be affected by the relative price or opportunity cost of moral acts. This is consistent with the evidence from sociobiology on human altruistic behavior that individuals place close attention to costs in their decision making (Singer, 2000; Trivers, 1971; Wilson, 1978, 1999). Thus, differences in target income, real income, and opportunity cost affect the equilibrium quantity of moral acts supplied. Given real income and opportunity cost, the supply of moral acts is a function of individual preferences which is reflected by the position and curvature of the indifference curve. It is the equilibrium position of the indifference curve derived from the individual's preference function which yields what one might refer to as core moral acts, core acts of altruism, or core ethical behavior. The core is affected by education and more broadly by culture (Mayr, 2001; Pinker, 2002; Ridley, 1996; Wilson, 1978, 1999, 2000) and by an individual's social networks, family, affinity to particular causes or organizations, and feelings of reciprocity. It is also a function of the extent to which moral acts yield good feeling or a warm glow (Andreoni, 1989, 1990) which is affected by ones affinity to the recipient of moral acts as well as by the extent of reciprocity or expected reciprocity from the supply of a moral act.[5] Given the equilibrium supply of core moral acts, the marginal supply is determined by the opportunity costs involved in engaging in moral acts.

Therefore, consistent with both contemporary economic theory and sociobiology, rational individuals are assumed to be affected material considerations. But the objective function is opened up to incorporate the significance of non-material and non-self-interested concerns. The modeling framework presented here would 'predict' that both opportunity costs and income to play a large role in the supply of moral acts. But the extent of core moral acts versus that which is determined by economic variables is an empirical question.

4. A Graphic Analysis

A revised modeling of choice behavior is illustrated in Diagram One where the quantity of moral acts, measured in monetary terms is mapped out as an alternative to the consumption of income. In the conventional world view the rational utility maximizing agent behaves in a manner consistent with the tangency of the price line and the indifference curve. This yields the utility maximizing combination of moral acts (the opportunity cost of which is income sacrificed) and income. If an individual was completely selfish and materially maximizing the rational individual will not engage in any moral acts which incur a material sacrifice. Nor would the individual engage in moral acts which require a sacrifice of labor time (which can be subsumed under income where labor time sacrificed can be denominated in terms of lost income). This is the caricature of the neoclassical agent.

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[5] The revised analytical framework also creates analytical space for changes in tastes and differential tastes across individuals and groups an independent variable. This is consistent with Becker's revised modeling narrative (1996, 16) wherein the latter can play an important role in affecting consumer preferences through the intermediary of personal and social capital. Changes and differences in tastes play no role in the contemporary economic narrative. However, in this revised model, individual and differential choices can be explained by incorporating both material considerations and changing and differential preferences.

In Diagram One, the selfish individual would be characterized by indifference curves I_7 and I_8, which are horizontal and therefore completely insensitive to changes in price of moral acts. Moreover, increasing income has no effect on the demand for moral acts. The indifference curve simply shifts from I_7 to I_8. As income increases, above minimum physiological requirements, the 'neoclassical' agent uses this surplus income to purchase more goods and services. This individual always maximizes utility by maximizing material wellbeing. The less materialistic individual can be characterized by the other indifference curves mapped out in Diagram One. I_1 characterizes an individual who at income A will not sacrifice materially to engage in moral acts, but is sensitive to the relative price of behaving morally or ethically. A lowering in the relative price of moral acts yields an increase in moral acts from 0 to m (with tangency at f). I_2 and I_3 characterize individuals whose utility are maximized by demanding a relatively greater quantum of moral for any given level of income and who are also sensitive to changes in the relative price of moral acts. To the extent that moral acts are regarded as normal goods, the demand for moral acts would be a positive function income. Thus shifting indifference curves I_2 and I_3 to I_4 and I_5 respectively would yield a higher equilibrium demand for moral acts consistent with g and h respectively. In this type of scenario the income effect would be related to a variety of factors including the target income which an individual associates with a higher level of real income. At an extreme, one might find individuals characterized by indifference curve I_3 and I_6, where given income the individual maximizes utility by maximizing the quantity of moral acts, retaining only enough real income to meet subsistence needs, I_{min}. Any increase in income simply results in an increase in the supply of moral acts (equilibrium shifts from j to i as the budget curve shifts from AB to CD). Even for this type of extreme altruistic behavior the individual is sensitive to price changes. Increases in the price of moral acts force the individual to supply fewer moral acts given that he or she is already at I_{min}.(income effect), whereas a drop in price allows the individual to supply more moral acts without cutting into minimum real income constraints (income effect again).

This modeling suggests that even for the very altruistic individual income plays a very important role in determining amount of moral acts which an individual would like to supply (or the demand for moral acts by the individual). Ceteris paribus, one would expect that a low income individual would supply fewer moral acts than a more materially well endowed person. Given identical preference functions, an individual is revealed to be more altruistic the more income she or he has. Therefore, when poor person appears to be less altruistic than a wealthy individual, this may have nothing to do with differences in preferences and everything to do with differences income and what an individual can afford given his or her target level of necessary or desired income (required to purchase target goods and services). Ceteris paribus, one would expect the quantity of moral acts which an individual demands (would like to supply) to be a positive function of income.

Individuals can differ in preferences as well and preferences can change with regards to the demand for moral acts—illustrated by different indifference curves along a budget constraint. Therefore, one determinant of the supply of moral acts is the preferences of individuals and changes in these preferences. Education, peer pressure, difference social environments or groups affects the position of the indifference curve. Therefore, one can have a high income society where the supply of moral acts is less than in a low income society and one can have a society where income increase have little affect on the supply of moral acts. Social environment can be expected to affect the supply of moral acts. But given one's social environment relative prices and income and changes therein can be expected to play the lead role in the supply of moral acts.

Fitting into traditional economic analysis one can separate the impact of price changes on demand into substitution and income effects wherein the extreme materially selfish individual would react differently than their more altruistic counterparts. In Diagram Two, if one begins with indifference curve I_1 and budget constraint CD with an equilibrium at a, our individual is maximizing utility by minimizing the consumption of income at I_{MIN} (assume this is the physiological minimum) and therefore maximizing his or her demand for moral acts at 0f. For this highly altruistic individual, increasing the price of moral acts (given by CG or bB) yields price effect fj decline in moral acts—the new equilibrium is achieved at point c along indifference curve I_2. The quantum of moral acts declines even for the altruistic individual given that target income I_{MIN} must be met The demand for moral acts is the residual. The price effect can be decomposed into substitution effect fh and income effect hj. If the initial equilibrium demand for income I_{MIN} is not the physiological minimum but rather represents a socially determined and somewhat flexible target income, the price effect could have been less severe since the income effect could result in the reduction in the demand for both moral acts and income. The individual would here be sacrificing some income so that he or she need not sacrifice as much moral acts as would be otherwise required. The new equilibrium would be given by indifference curve I_3 at t.

A fall in the price of moral acts generates symmetrical results. Beginning with equilibrium c at indifference curve I_2 a fall in price results in price effect jf as the price line pivots from CG to CD, with the new equilibrium at a. This is for a fairly altruistic person whose target income does not change as real income increases. In this case, the substitution effect is given by jk, where price line YZ is parallel to CD. The income effect is kf. For an individual whose target income is a positive function of real income the price effect would be less, for example jv, as a less altruistically inclined individual would not be willing to sacrifice as much of his or her increased income to increase the demand for moral acts as would the more altruistically. The substitution effect remains at jk, but the income effect is now only kv.

Applying the analytics of substitution and income effects underlines the potential importance of changes in relative price and income as determinants of the demand and therefore supply of moral acts for individuals with a wide array of preferences for moral acts. Also of importance is the target income of the individual and the extant to which it changes, if at all, with changes in real income, as relative price rises or falls. For the completely materially maximizing individual, the demand curve for moral acts is zero irrespective of price—perfectly inelastic with respect to price and with zero as his or her target quantity of moral acts.

The above indifference curve type analysis yields individual and social demand curves for moral acts, indicating the amount moral acts which an individual demands (prefers to supply) at alternative prices. Since this unique type of demand curve also specifies how many moral acts an individual is willing to supply, information on the demand curve and price suffice to yield the equilibrium demand for moral acts and thus the amount of moral acts that will be supplied given price. Changes in income and preferences shift the demand curve.

In Diagram Three, the cost or price of moral acts is numerated in terms of opportunity costs of lost income along the vertical axis. At 0A, when price equals total income the supply of moral acts would be zero accept for those who can borrow to meet their own basic target needs. This is not

sustainable unless particular individuals can be subsidized to be extremely altruistic. This is, therefore, not truly altruistic behavior. For a subsidized individual the demand curve's point of origin would be A, and 0F of moral acts are supplied even when this allows for zero retained income. This individual's demand curve would be ABD, where the BD component is a negative function of price or opportunity cost. Otherwise, the demand curve's point of origin is H where AH is the individual's target income—the retained income required for physiological and/or social-psychological reasons. Given that the more altruistic individual has a lower target income (approaching the physiological minimum), the demand curve the less altruistic person would have its origin below H—at the extreme it would be zero. The negative slope is given by the substitution effect and the income effect for moral goods as a normal or superior good. As long as target income is a relatively stable there is little reason to expect that this demand curve would be anything but negatively sloped, Changes in income and in preferences (towards becoming more or less altruistic) pivots the demand curve, such as from HC to HD.

Individuals might also be characterized by kinked demand curves such as is illustrated in Diagram Four. Assume that an individual has a target income yielding a target quantity of moral acts, given by 0F for example. The kink point of origin is a function of income. For both the more and less altruistic individual one would expect that demand would be relatively elastic with respect to price increases since this would cut into ones target income. However, one would expect the more altruistic individual is characterized by relatively more elastic demand as price falls, BD as opposed to BC, since the more altruistic individual will exploit the resulting real income increase to demand (supply) more moral acts as opposed to more retained real income. Society's demand curve would be relatively smooth given that moral demand curves would most probably vary across individuals.

5. By Way of Example

Evidence derived from the tipping literature provides a good illustration of the notion of core and marginal acts of altruism or morality, where an extensive literature strongly supports the view that individuals engage in tipping for a variety of non-economic reasons, requiring material self-sacrifice. Lynn (2005; see also Lynn 2003; Azar 2003, 2004a, 2004b) summarizes some of the key finding of the tipping literature:

> "…explanations for this behavior must go beyond the neoclassical idea that people base tips on service quality to ensure good service in the future. Adequately explaining individuals' tipping decisions requires a more behavioral approach – one that broadens the traditional consumer utility function to include desires to avoid guilt, obtain social approval, obtain status, treat others equitably, and help others as well as one that recognizes cognitive capacity, knowledge, mood, and other cold, cognitive processes as having a causal impact on economic decision making and behavior.

This suggests that there exist a core amount of tips, independent of opportunity costs and income. It is important note that tips represents a tiny percentage of an individual's income and therefore represent a relative small quantum of self-sacrifice. And tip size tends to diminish with bill size. The latter is consistent with view that moral acts are affected by opportunity cost.

Some experimental evidence is strongly suggestive of the importance of both economic and non-economic variables with a strong bias in favor of opportunity costs. This experimental evidence is also suggestive of significant difference in core altruism or moral acts across individuals. The experimental results most pertinent to this study are (Fong 2005, 66, Table 6) as follows. There are two categories of tippers, one which pays out a relatively generous tip irrespective of service quality and another group provides a tip approaching zero if service is poor. The latter group comprises 74 percent of the sample. For both groups tipping is highly sensitive to changes in service quality. For a restaurant that will never be visited again the mean tip is 13.3 percent for the first group and 12 percent for the second when service is excellent, 11.3 and 7.5 percent respectively when service is average, and 8.3 and 0.25 percent respectively when service is poor. For a frequented restaurant the mean tip is 16 percent for the first group and 14 percent for the second when service is excellent, 12 and 9 percent respectively when service is average, and 9 and 1.4 percent respectively when service is poor.

Quality of service is a proxy for opportunity cost in the sense that as quality deteriorates, ceteris paribus, this is analogous to paying more for a given product. Individuals are typically willing to pay more for a given product of a higher quality and less for a product of a lower quality. There are clearly two groups of individuals in this sample. One group pays out a relatively large tip irrespective of service quality whereas the other group's tip percentage is almost entirely predicated upon service quality. For one group the core tip or moral act is relatively large. For the other group the core tip is quite small. It is the latter group that dominates the sample. However, even for individuals who provide a relatively large core tip, changes in tip percentage is substantively affected by service quality.

This experimental evidence provides strong support for concept of core and marginal moral acts whereby the importance of both economic and non-economic variables are underlined. It is clear that for both groups economic variables are critical at the margin and marginal effects are always large. It is also important to note the large differences in core tips. This suggests the importance of non-economic variables in affecting differences in core moral acts between individuals.

6. Conclusion

Conventional economic theory, when modified to incorporate moral or ethical acts, better explains choice behavior by rational individuals outside of the firm. It is important for theory to incorporate the fact that individual choice is affected by income, opportunity cost (which includes quality characteristics), and non-economic variables. It is also important to introduce the concept of target income into the analysis. Economic variables remain of fundamental importance—individuals cannot be modeled as being totally dominated by preferences for self-sacrifice. The enhanced economic model yields a negatively sloped demand curve (which is also the supply curve) for moral acts, differing across individuals, contingent upon their preferences for supplying moral acts. At the extreme, we have the material maximizer (the caricature the neoclassical economic agent) whose demand for and supply of moral acts is zero irrespective of price and income.

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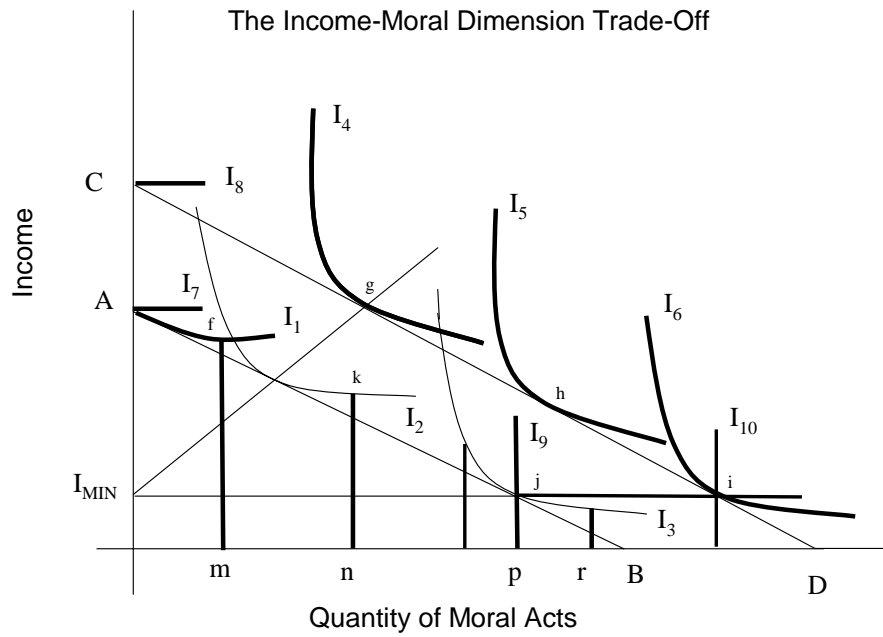Wilson, E.O. 1999. Consilience: The Unity of Nature. New York, Vintage Books.
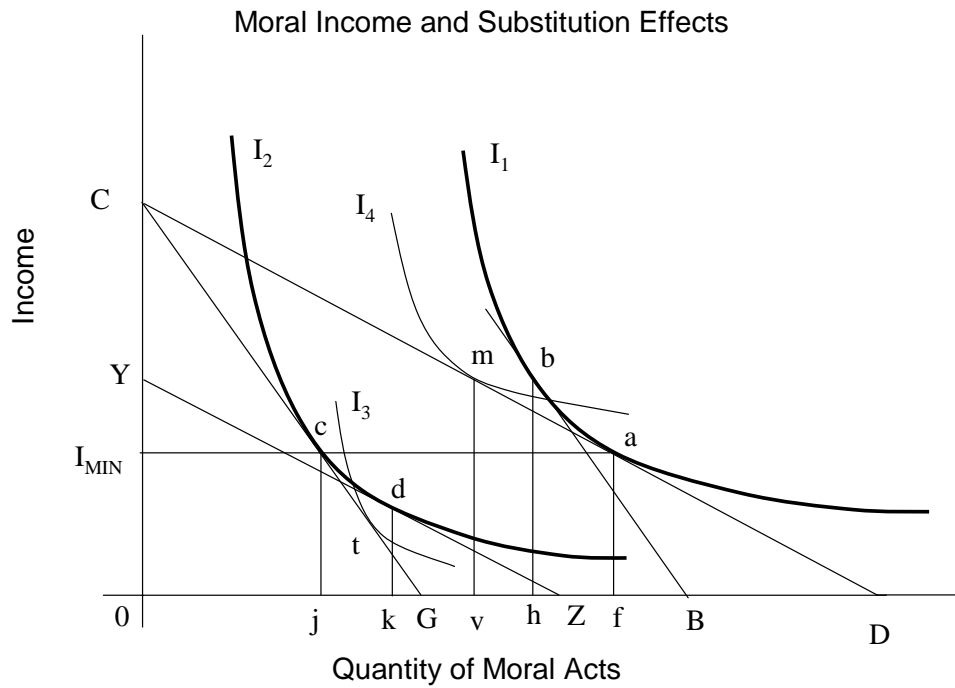
Diagram One

The Income-Moral Dimension Trade-Off

Income

C

I_8

I_4

A

I_7

f

I_1

g

I_5

I_6

k

I_2

h

I_9

I_{10}

I_{MIN}

j

i

I_3

m   n   p   r   B   D

Quantity of Moral Acts

Diagram Two

Moral Income and Substitution Effects

Income

I_2

I_1

C

I_4

Y

m   b

I_3

c

a

I_{MIN}

d

t

0   j   k G v   h Z f   B   D

Quantity of Moral Acts

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Diagram Three

The Relative Cost of Morals Acts and Demand

100 % of income

AB = BORROWED FUNDS

B

A

H

Cost per Moral Act Relative to Total Income
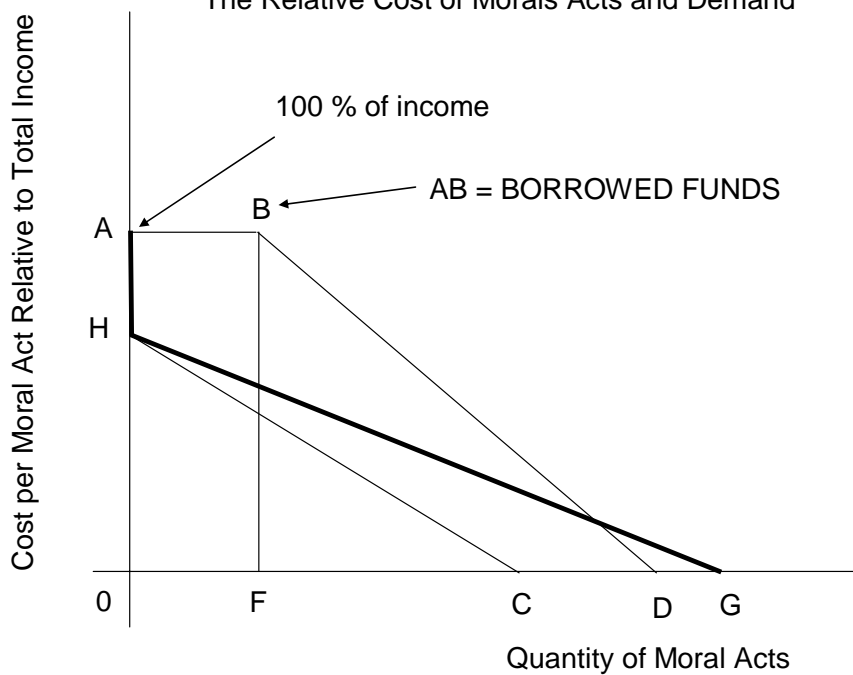
0   F   C   D   G

Quantity of Moral Acts

Diagram Four

Kinked Individual Demand Curves for Moral Acts

100 % of income

A

H

B

C

D

Cost per Moral Act Relative to Total Income

0   F

Quantity of Moral Acts

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