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# IS STATUS QUO BIAS CONSISTENT WITH DOWNWARD SLOPING DEMAND?

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## ABSTRACT

We show that status-quo bias combined with downward-sloping demand implies
addictive behavior. This result does not depend on transitivity, a complete ordering, or
even the existence of a preference relation that rationalizes choices.

# IS STATUS QUO BIAS CONSISTENT WITH DOWNWARD SLOPING DEMAND?

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By now there is a large experimental literature showing some kind of status-quo bias.[1] If the subject is given a coffee mug (candy bar) and later given the possibility of trading it for a candy bar (coffee mug) of equal value, the subject is likely to stick with the original allocation (Knetsch, 1989). Here, we ask whether status-quo bias can be made consistent with downward-sloping demand curves. This paper thus differs in intent from a large body of research that incorporate some notion of status-quo bias into a more general formulation of revealed preference (see for example, Masatlioglu and Ok, 2003, and Sagi, 2003). As this body of research demonstrates, there are different sets of primitives that lead to different axioms of revealed preference. In this paper, we don't care which set of primitives hold. Indeed, we do not care whether such results can be incorporated into the neoclassical model of consumer behavior (see Munro and Sugden, 2003).[2] Instead we undertake a strict behavioralist approach: Individuals display status-quo bias and downward-sloping demand curves. Whether such behavior is rational or even whether both patterns of behavior can be derived from a consistent set of assumptions is irrelevant. Indeed, we do not require the existence of a preference relation that rationalizes choices at all – all that is required is choice behavior. What we want to find out is the implications of such observed behavior; in particular, we want to determine whether status-quo bias and downward-sloping demand curves are consistent with each other. The short answer is yes, but the consumer will display addictive behavior.[3] The remainder of the paper will be devoted to demonstrating this result.

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[1] Plott and Zeiler (2003) review 45 experimental articles finding an endowment effect.

[2] Bossert and Sprumont (2001) consider conditions for the existence of a relation such that the agent choice is no worse than the status quo, but there is no status-quo bias.

[3] The addiction result can be seen as a generalization of the ostensibly unrelated literature on habit formation. See Pollak, 1970, whose seminal contribution assumed a particular utility function and a linear habit formation function (here, we neither have a utility function nor a particular habit forming function).

We will make the following set of assumptions:

A1. There are two goods, $x$ (candy) and $y$ (wine), which are continuously divisible.

A2. Prices and incomes are exogenously determined. That is, the person has a budget line and budget set.

A3. The individual chooses a point on the budget line.

A4. Strictly downward-sloping demand: if the person chooses $x_t$, $y_t$ for a given budget set, $b_t$, and then the person is faced with a different budget set, $b_{t+1}$, that goes through $x_t$, $y_t$ but where the relative price of x has gone down (up), then $x_{t+1} > x_t$ and $y_{t+1} < y_t$ ($x_{t+1} < x_t$ and $y_{t+1} > y_t$).[4]

## 1. Status quo consumption

The world that we consider is very simple. In the initial period, the experimenter (god) allocates a certain amount of $x$ and $y$ to the individual (this is the status quo allocation in period 0) and also announces the prices (thus nominal income is also determined).[5] The person must decide how much of each item to consume in that period. For simplicity, we will assume that in period 0 the allocation is in equilibrium; that is, the desired choice by the individual is the allocation provided (god reads the individual's mind and makes an allocation that will be in equilibrium). Without the assumption of equivalence between the allocation by the experimenter and choice by the subject we would immediately have addiction.

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[4] We only need to have *strictly* decreasing demand for the good that we are investigating and only for one price change (since prices only change once).

[5] Presumably, before the experiment, the person had a status quo consumption profile of goods, $S_{00}$, with its attendant biases.

In period 1, the budget set rotates around the status-quo allocation point so that the relative price of $x$ decreases; there are no changes in the budget set in any of the following periods. In period $t \geq 1$ the status quo is the consumption profile in the previous period, t-1. In this example and in the real world, customary consumption is the obvious candidate for the status quo point. After all in the real world, most of us are paid in money rather than in things so the endowment of goods (except possibly money itself) is not a good candidate for the status quo reference point although such an interpretation is possible. We can thus characterize the sequence in two equivalent ways. (1) In period 0, the experimenter allocates a certain amount of $x$ and $y$ and announces the price ratio (equivalently budget set 0), and in periods 1 through N, the experimenter provides budget set 1; or (2) In period 0, the experimenter allocates a certain amount of $x$ and $y$ and budget set 0, and in periods 1 through N, the experimenter provides the allocation of $x$ and $y$ equivalent to the person's choice of $x$ and $y$ in the previous period and a set of prices so that the budget set remains the same from period 1 on.

Let $(x^{sq}, y^{sq})$ be the status quo and let $(x_{sq}, y_{sq})$ be the person's choice given the status quo and the budget set. That is, the individual's choice $(x_t, y_t)$ in period t can be characterized by the function $Cx^t y^t(b_t)$ which chooses a point in $b_t$ for any given status quo $(x^t, y^t)$. Thus, the choice function is "reference dependent" on the status quo consumption. Note that our presentation does not require the choice to be optimal or that the individual can rank order the alternatives.

Let $(x^{sa}, y^{sa})$ and $(x^{sb}, y^{sb})$ be two possible status quo allocations on the same budget line.

*Definition:* An individual has *status quo bias* if $(x_{sa} < x_{sb})$ and $(y_{sa} > y_{sb})$ whenever $(x^{sa} < x^{sb})$ and $(y^{sa} > y^{sb})$. This captures the essence of the status-quo bias: If the status quo position $a$ is to the left of status quo position $b$ on the budget line, then the choice on the

budget line when $a$ is the status quo will be to the left of the choice when $b$ is the status quo.

We will now show that when there is status-quo bias, a one-time decrease in the price of $x$, will result in an ever-increasing demand for $x$.

*Proposition:* Given the above assumptions and characterization, if there is status quo bias, then a one-time rotation in the budget set around the status quo that results in the relative decrease in the price of $x$ will result in an ever-increasing demand for x.[6]

*Proof:* Suppose that in period 0, the status quo allocation is the choice given the budget set; that is, $x^0, y^0 = x_0, y_0 = Cx^0y^0(b_0)$. That is, the status quo at $t = 0$ is in equilibrium.

Suppose next that in period 1, the budget set swivels around $(x_0, y_0)$ so that the relative price of $x$ decreases. This is the new budget set is $b_1$. Then the status quo remains the same; that is, $(x^0, y^0) = (x_0, y_0) = (x^1, y^1)$. Thus, $x_1, y_1 = Cx^0y^0(b_1) = Cx^1y^1(b_1)$ where $x^1 > x^0$ and $y^1 < y^0$. That is, when the price of $x$ falls, the demand for $x$ increases and the demand for $y$ decreases (A4).

Note that $b_t = b_1$ for all $t \geq 1$.

In period $t$, the status quo point is the consumption profile in period $t$-1. Thus in period 2, the consumption profile $x_1, y_1$ will be seen as the status quo. Therefore, in period 2 the individual will choose $x_2, y_2 = Cx^2y^2(b_1) = Cx_1 y_1(b_1)$. Because $x^2 = x_1 > x_0$ $= x^1$ and $y^2 = y_1 < y_0 = y^1$, status-quo bias will result in $x_2 > x_1$ and $y_2 < y_1$. In period 3, $x_2, y_2$ will be seen as the status quo, and the whole process will start over again. The

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[6] Note that ever-increasing does not mean that there is no supremum nor does it mean that the supremum is where the budget is solely devoted to $x$.

chosen allocation will continue to shift towards greater $x$ and less $y$. Hence, status-quo bias can be seen as implying addiction, where the individual buys more and more of the item.[7]

<div align="right">q.e.d.</div>

Alternatively, the status quo could be viewed as a weighted sum of the present status quo and the previous status quo. Clearly this does not change the analysis; it just makes each move smaller.

## 2. Concluding remarks

Asset bubbles and collecting stamps might be characterized as a type of addiction, but it is unlikely that consumer behavior is in general addictive. If one day your neighbor gives you peas, it is unlikely that you will start on a never-ending spiral of eating more and more peas. So one might question the validity of one or both of the behavioralist assumptions employed in this paper. In this case, downward sloping demand seem more universally true than status-quo bias, but perhaps that is just the status-quo bias of a neoclassical economist. Still there is some experimental evidence arguing against status-quo bias. Plott and Zeiler suggest that most (but not all) of the observed status-quo bias may be an artifact of previous research methodology. From a more theoretical perspective, Mandler (2004) claims that people don't want to make choices right away when they are put into a new situation because they don't have a complete ordering. Hence what appears to be status-quo bias may just be cautionary behavior. Status quo bias may be ephemeral rather than persistent.

In the end it is important to emphasize that the argument here is not against the behavioralist enterprise in general, but rather against one particular well-cited result – status-quo bias. There may well be other behavioral relationships that are contradictory of

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[7] Starting with Becker and Murphy (1988) there have been a host of papers that have assumed addictive behavior rather than deriving addictive behavior from more primitive relationships as we have done here. See for example, Aspesteguia and Ballester (2004) who assume that the person is addicted and then derive the preference relationships rather than deriving addiction from status-quo bias.

both standard neo-classical economics and status-quo bias. For example, Koszegi and Rabin (2004) have a model that is based on expectations rather than on the status quo. But whatever the set of behavioral observations or assumptions, one should undertake the kind of exercise undertaken in this paper and determine whether the set of behavioral observations imply behavior that is consistent with the real world.

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