Title: A Dynamic Structural Model of Mental Accounting

Overview:

Mental Accounting provides a behaviorally motivated framework for understanding consumer economics. Although it has the potential to account for a number of (otherwise puzzling) consumer behaviors and has been met with broad acceptance by researchers, there are no field studies that econometrically estimate a mental accounting model. We build on the theories of Thaler (1985, 1990) to develop a dynamic, structural bounded-rationality optimization model of mental accounting that can be estimated with latent-variable inference methods on agent-level transaction data. In each period, consumers choose their consumption expenditures over a finite number of categories -- i.e., mental accounts -- and plan for future consumption by infrequently re-evaluating whether or not they have over- or under-spent relative to budgets they previously set for themselves. Consumers' relative over- or under-expenditure informs their optimal budgeting decision for future periods. In this way, consumers plan their future expenditure relative to the planning error they made last period. At the extremes, our model nests both neo-classical and mental accounting theories, allowing consumers either to adjust their expectations of future expenditure (at one extreme), or to engage in strict mental accounting and treat money as non-fungible (at the other extreme). In between these extremes, our model reconciles both behavioral and neo-classical models within an econometric framework. We estimate our model using data on consumer purchases, deposits, and transfers, as recorded by their bank. These data provide a rich source of information from which to infer how consumers categorize savings and expenditures. Our parameter estimates suggest that the behavioral profiles of most consumers reside somewhere between the extremes of pure mental accounting and neo-classical

consumption smoothing. To the best of our knowledge, this model is the first of its kind that can empirically estimate, using expenditure data, the extent to which consumers behave according to mental accounting versus neo-classical rational expectations.

Theoretical Results:

Our model contributes to the literature in two important ways: first, we show that depending on consumer preferences, mental accounting can induce either lower or higher levels of savings than the standard economic dynamic consumption-savings model would predict; second, we show that consumers who engage in mental accounting are more price-sensitive as expenditure approaches the pre-set mental account limit. Second, the model we develop accounts for consumers budgeting goals which precede their expenditure decisions, within an expected utility optimization context, thus answering in the affirmative a question posed by Medin and Bazerman (1999) whether it is possible for a utility optimization model to capture both ex-ante goal-setting and ex-post decision-making, while accounting for the implicit errors consumers make in fulfilling these goals. Finally, our model offers a unifying framework from which to explain consumer economic behavior as an outcome of bounded rationality, where the bounds on rationality can be measured econometrically.

Data and Estimation:

We estimate agent-level preference parameters using transaction-level prepaid card data from a large American bank. Since prepaid card customers are more likely to be low-income and underbanked, they are more likely to use their prepaid card for all of their expenditures, thus selecting on this sub-sample reduces the risk of missing observations. Our dataset contains complete consumption-expenditure transaction profiles for 3,000 customers from 2011-2014. We

employ hierarchical Bayesian learning to estimate each consumer's unique distribution of structural preference parameters and time series of implicit mental account budgeting decisions.

Empirical Results and Implications:

Our estimates reveal that a large portion of consumers engage in active mental account budgeting. For example, we find that approximately 70% of our sample do so. For these customers, banks and pre-paid debit card suppliers could facilitate Pareto improvements to both consumer and bank welfare by designing smart-banking products that discourage continued spending when period expenditure levels approach a pre-chosen mental account budget, thus ensuring that consumers stick to a consumption/savings plan and that banks benefit from consumers maintaining higher net balances. Our estimates suggest that approximately 10% of consumers are myopic with respect to budgeting for themselves and that these consumers have lower average incomes than others in our sample. This subset of customers could benefit from the implementation of smart banking products -- i.e., push-based balance notifications -- to make them more aware of their consumption/savings behavior in order to encourage higher savings rates.

References:

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