7. Choosing to choose – the dynamics of store, product, and consumption choices
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7.1 INTRODUCTION

A growing body of psychological research suggests that people in developed countries face too many choices, choices they would be better off avoiding. When they shop, people can visit more stores of increasingly diverse retail formats, each store offering more extensive product assortments than before. Choosing products from these assortments imposes cognitive costs (Shugan, 1980; Chernev, 2003), which can lead to information overload and suboptimal choices (Jacoby et al., 1974a, 1974b; see Chernev et al., 2015 for a review). Yet people continue to find choice inherently attractive. As shoppers, they are drawn to stores that offer more product alternatives from which to choose (Baumol and Ide, 1956; Brown, 1989; Iyengar and Lepper, 2000; Briesch et al., 2009). As consumers, they often choose a variety of product alternatives to hedge against future preference uncertainty (Walsh, 1995; Salisbury and Feinberg, 2008; Fox et al., 2017).

In this chapter, we will review evidence that people seek, construct, and preserve choices when shopping for and consuming products. Uncertainty about their future preferences (Pessemier, 1978; March, 1978; Kreps, 1979; Kahneman and Snell, 1990) leads people to prefer flexibility as a rational hedge. As a result, consumers do not simply choose their favorite products. We will explore the dynamics of three different choice levels. First, we will show that store choice requires anticipation of subsequent product choices – this is well understood and non-controversial. We will also show that product choices made in-store require anticipation of how those products will be consumed at home – this is less well understood as the literature evolves. Finally, we will present evidence that consumption choices themselves require anticipation of future consumption choices, which will be made from the products that remain in inventory.

Most of the literature in this area has studied hedonic products, perhaps because future preference uncertainty is particularly relevant for such products. The common premise underlying these studies is that shoppers choose products at the store to consume later at home. Our review will

therefore focus on published studies of hedonic products commonly pur-
chased in supermarkets and other grocery stores for future consumption.
However, the frameworks and findings we will present may generalize
beyond this context.

We begin with a simple conceptual framework, shown in Figure 7.1.
A rational shopper first chooses a grocery store from which to purchase
products.[1] The store choice decision depends, at least in part, on product
assortments in those stores (e.g., Baumol and Ide, 1956; Arnold et al.,
1978; Arnold et al., 1983; Arnold et al., 1981; Arnold and Tigert, 1982;
Briesch et al., 2009).Which assortments affect store choice? That depends
on which category inventories in the shopper's home have been depleted
(in the figure, feedback about in-home inventories is represented by
dashed lines). When a store is chosen, assortments at that store become
choice sets for the shopper's product choice decisions. When choosing
hedonic products, a rational shopper anticipates future consumption,
typically multiple consumption occasions. Standard choice models assume
that the shopper chooses a single product of a common package size (or

Blattbergt al., 2081; . WhPduct ofoice m-

of choice sets (both selected in store and constructed at home) on the sequence of choice decisions.

Perhaps the defining characteristic of the sequence of choices in Figure 7.1 is their inherent dynamics. A rational decision maker makes forward-looking choices, anticipating their effects on subsequent choices. This chapter will review the literature related to the dynamics of shopping and consumption choices in the same way that one develops a dynamic model. The final decision, on which previous decisions directly or indirectly depend, is the choice of a product for consumption. This is where we begin.

7.2 CONSUMPTION CHOICE – PRESERVING FLEXIBILITY FOR FUTURE CONSUMPTION

Consumption choices are made from the set of products in a category that the consumer has in inventory at home. The consumer may have an inventory of zero, one, or multiple product alternatives (i.e., different SKUs). The inventory quantity of each product alternative may be considered in terms of servings, where a single serving is consumed on each consumption occasion. This allows one to accommodate different package sizes.

If no products are in inventory, there is no consumption choice (this case would also represent feedback for store and product choices; see Figure 7.1). If a single product alternative is in inventory, the consumer can choose only that alternative. If multiple product alternatives are in inventory, however, the consumer chooses between those alternatives. It is commonly assumed that the consumer chooses her/his most preferred product; in other words, that the consumer's preference is revealed (e.g., Guo, 2010). In economic terms, this implies that the chosen product offers the highest consumption utility. However, while consumption utility is known at the time of consumption, it is not known with certainty for future consumption occasions.

Uncertainty about future consumption utility (hence future consumption preferences) has been attributed to any number of different factors,

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of product alternatives.[4] Analysis of their more general model yielded a closed-form consumption policy, adding precision to Walsh's insight. They determined that a rational consumer would choose a product alternative for consumption in proportion to the in-home inventory of that alternative. Fox et al. (2017) also analyzed a second model, which included an outside option, thereby allowing for differences in consumption rate. Analysis of this model also yielded a strategic consumption policy in closed-form, albeit without additional insight.[5]

Taken together, these studies offer a compelling basis for rational consumers to make consumption choices that preserve flexibility (i.e., that retain product alternatives) for the future. A rational consumer will therefore not necessarily consume the product alternative that maximizes current consumption utility; instead, s/he is more likely to choose a product alternative with greater inventory. This strategic approach to consumption serves to balance inventory across product alternatives as they are consumed, thereby preserving choices for future consumption.

7.3 PRODUCT CHOICE – CONSTRUCTING FLEXIBLE CHOICE SETS FOR FUTURE CONSUMPTION

Recall that consumption choices are made from the set of product alternatives in inventory at the consumer's home. This set depends not only on recent consumption choices, but also on product purchases. Shoppers construct the set of product alternatives (and the inventory of each alternative) by choosing products in-store. In this section, we will examine the research addressing variation in product choices, particularly hedonic product choices. This research is extensive, owing to ubiquitous point-of-sale scanners, loyalty card programs, and the wide availability of syndicated panel data.

One possible explanation for variation in product choices is that shoppers purchase for multiple consumers in their households, each preferring a different product alternative. Though within-household preference heterogeneity could certainly cause variation in product purchases over time, this explanation has been largely ignored. Perhaps this is because in-home consumption, particularly for multiple users, is seldom observed and recorded.

Several other explanations for variation in purchase choices have attracted far more interest in the literature. Figure 7.2 presents a matrix to organize that literature. The vertical dimension of the matrix relates to purchase occasion – either across purchase occasions (i.e., over time) or

attributes such as sweetness, flavor, and caffeine. McAlister's application was unusual in that variety-seeking models have been applied far more often to purchase data than to consumption data, even though variety seeking affects consumption preferences. As Richards et al. noted, "... while demand theory rests on consumption, data reflect purchases" (2012, p. 207).

Returning to the random utility paradigm, variety seeking based on satiation/stimulation would affect the deterministic component of util-ity. Consuming a product reduces the deterministic component for that product (or a product with similar attributes) on the next consumption occasion, reducing the probability that it will be chosen again. Most choice models incorporating variety seeking assumed that consumption utility is affected by which product was consumed on the most recent purchase occasion (Givon, 1984; Lattin and McAlister, 1985) or two (Kahn et al., 1986). Several empirical applications of these models actually found "negative" variety seeking, often called inertia; i.e., the probability of choosing a product increases if it was chosen recently. A hybrid model, allowing for both variety seeking and inertia, was found to fit data better than inertia or variety seeking alone (Bawa, 1990). But these findings, like the majority of variety-seeking studies (with the notable exception of McAlister, 1982), used purchase data rather than consumption data. As Bawa explained

> While the model relates to individual-level behavior, we illustrate its applica-tion using household-level panel data. This is because it is desirable to have a large number of observations available for parameter estimation, and a sufficient number of observations on individual-level consumption is not easily obtainable. (1990, p272)

This limits the generalizability of their results.

7.3.2 Multiple Discreteness

More recently, econometricians have addressed the purchase of multiple products for future consumption, with products varying by brand, flavor, variety, and/or package size. This research has focused primarily on the effects of multiple purchases on price and promotion response. The general approach has been to extend discrete choice models to accom-modate the choice of multiple products – multiple discreteness, as it came to be known. Dube (2004) assumed that shoppers' purchases would be consumed over an unknown number of future consumption occasions. Consumption utility for each product was assumed to be concave and monotonically increasing in quantity, which leads to diverse multi-product

purchases. The resulting model was demonstrated using carbonated soft drink purchase data. Richards et al. (2012) focused on multiple discreteness among perishable products, in particular apples. This study used a satiation parameter to accommodate multi-product purchases, implicitly assuming that consumers prefer variety when buying for future consumption. Lee and Allenby (2014) derived a model that incorporates package size differences, in addition to brand and flavor variety. Concerned with the estimation problems posed by discreteness, this model was applied to simulated data and then to yogurt purchase data. The study found that ignoring discreteness results in biased parameter estimates and improper attribution of many zero purchase quantities.

These econometric models of demand assumed decreasing marginal utility for products (or attributes) in order to accommodate consumers' preference for variety. This causes the deterministic component of utility to change over time, depending on consumption.

7.3.3   Diversification Bias

Experimental psychologists have also studied the choice of multiple hedonic products for future consumption. This choice was termed "simultaneous choice," contrasting with the "sequential choice" of individual products at the time of their consumption. The predominant finding from this research is that simultaneous choice sets include a greater variety of product alternatives than sequential choices do (e.g., Simonson, 1990; Simonson and Winer, 1992; Read and Loewenstein, 1995). The primary explanation for this "diversification bias" (cf. Read and Loewenstein, 1995) is a combination of variety seeking and poor forecasting. More specifically, the literature suggests that people overestimate their propensity to satiate on their favorite products during future consumption occasions, causing their simultaneous choices to include too much variety (Simonson, -

(1992) tested this implication using scanner panel data for the yogurt category, finding the expected positive relationship between the total number of units purchased and the variety of flavors selected. Read and Loewenstein (1995) investigated whether diversification is actually a bias or is consistent with rational utility maximization. This study found bias in two forms – "time contraction" and "choice bracketing." Time contraction is the tendency to overestimate the time between consumption occasions, which causes people to overestimate satiation and therefore select too much variety. Choice bracketing contrasts the broader decision scope of simultaneous choice (selecting all products at once) with the narrow scope of sequential choice (a single product at a time). Note that choice bracketing differs from variety seeking in that it focuses on the breadth, rather than the timing, of choices.

7.3.4 Inventory-theoretic

We now turn to normative explanations for variation in product choices. One such explanation uses inventory theory to model how shoppers may take advantage of time-varying retail prices to lower their average purchase costs. Lowering average purchase costs requires stockpiling when prices are low, which increases inventory-holding costs. Rational shoppers must therefore balance purchase costs (i.e., retail prices) and holding costs.

Blattberg et al. (1981) proposed the first such inventory-theoretic model of product purchases. This model made the simplifying assumption of a constant consumption rate, but noted that consumption would actually (1) depend on prices and (2) include a random, or stochastic, component. This model was used to predict the frequency and depth of retail price discounts; these predictions were then tested using panel data. Assuncao and Meyer (1993) proposed a dynamic inventory model that investigated
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second component the "choice premium." The minimum choice premium is zero, which occurs if the consumer chooses all units of a single (presumably the favorite) product alternative. The maximum choice premium is ln (n!), which occurs when the consumer chooses one unit each of n different product alternatives. More generally, the choice premium increases (1) as more product alternatives are included in the choice set and (2) as units are distributed more evenly across those product alternatives. Optimal diversification of a set chosen for future consumption balances the choice premium with the expected utilities of products chosen. This balance is the normative basis for hedging in the construction of choice sets for future consumption.

Fox et al. (2017) introduced a second model that included an outside option; that is, a "no consumption" option for future consumption occasions. The outside option effectively allowed consumption rates to vary. Analysis of the model showed that, as the consumption rate slows, the optimal choice set may become only more diversified. Thus, the rate of consumption affects the choice set that should be constructed for future consumption.

7.4 STORE CHOICE – SELECTING ASSORTMENTS FROM WHICH TO CHOOSE PRODUCTS

Conceptually, choosing a store implies choosing the option to purchase a subset of products offered by that store. Baumol and Ide (1956) developed a probabilistic model consistent with this point-of-view. Using the store's area (i.e., floorspace) as a proxy for the number of products offered, the model assumed that the probability of the shopper successfully finding the products s/he needs is an increasing function of the store's area, with that probability increasing at a decreasing rate. On the other hand, the model also assumed that the cost of shopping increases linearly with walking distances inside the store. Analysis of this model showed that "increased variety is an advantage to the consumer only up to a point" (p. 96); in other words, a larger choice set is not always preferred to a smaller one. Baumol and Ide (1956) also found that a store's optimal product variety does not depend on how far shoppers must travel to the store.

Partitioning a store's product offering into (1) the breadth of product categories offered and (2) the depth of product assortments within each category, subsequent research has generally focused on the latter. Because shoppers' needs are typically defined at the category level (Spiggle, 1987), product assortments can be viewed as choice sets from which product choices are made.

household's probability of shopping at a store during a given month. The study also found that assortments have a significant positive effect on spending at a store during the same period, which indicates more-frequent patronage. In the first study of store choice that focused primarily on category assortments, Briesch et al. (2009) addressed both the first issue (how to characterize an assortment) and the second (lack of temporal variation in assortments)[9] They proposed and estimated a model in which category assortments were characterized by (1) the number of brands, (2) the number of product alternatives per brand, (3) the number of sizes per brand, (4) the proportion of unique product alternatives (i.e., alternatives not available at other retailers) in the assortment, and (5) whether or not the shopper's favorite brands were available. This study found that the number of brands and the availability of the household's favorite brands significantly increased the probability of choosing a store. The other characteristics of assortment did not.

The decomposition of product assortments used by Briesch et al. (2009) drew on prior studies of assortment reduction, also known as SKU (stock keeping unit) rationalization. Broniarczyk et al. (1998) developed a conceptual foundation for assortment reduction, proposing that store choice depends on a shopper's assortment perceptions, which are based on actual product assortments. In two experiments, this study found that the perception of an assortment is determined by the amount of shelf space devoted to the category as well as the presence (or absence) of the shopper's favorite products. The study also found that assortment perceptions mediated the effect of assortment size on store choice. Based on thosertmeize on storb7la)
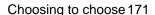
the same online retailer data found substantial negative effects of assortment reductions on store patronage and spending (Borle et al., 2005).

A related study by Chernev and Hamilton (2009) investigated how the attractiveness of products in an assortment affects a shopper's choice of assortment. In a series of experiments, they found that shoppers' preference for larger assortments was reduced or reversed for assortments composed of either (1) higher quality products, or (2) products that better match shopper preferences. In other words, the attractiveness of products in an assortment moderated shopper preference for larger assortments. The study also found evidence that greater differences in assortment size increase the moderating effect of product attractiveness.

Taken together, the research linking store choice with product assortments – effectively choosing a choice set for product selection decisions – leads to two primary conclusions. First, a shopper's store choices depend on stores' product assortments in the categories s/he needs.

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observed choices. As a minimum, hedging against future preference

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