Product Personalization and Customer Service Cost: An Empirical Analysis

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Abstract

We conduct a field study to examine how personalizing a product affects a firm's cost to serve the customers through its call center. In our setting, the product is a health insurance policy. These policies tend to be complex. Firm incurs the cost in serving the customers through its call center, and adjudicating the claims using its information systems. Firm sells either standard products, or in some instances allows the customers to personalize their policy by including, modifying certain aspects of the policy. We show that the process of personalization is such that it increases users' familiarity with his/her coverage and improves the fit with his/her medical needs. This, in turn, reduces their incentives to call the firm's call center for clarifications regarding their product coverage. In particular, we show that users with personalized policies call 30% less frequently than users with standard plan. Thus, our paper provides a link between product features and the ex-post cost of serving them. We also show that there is no difference in claim adjudication between a standard vs. personalized policy. Overall, our results suggest that, personalized products are cheaper to serve than standard products.

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1. Introduction

Service industry occupies a large chunk of economic activities in developed economies and is growing rapidly (Chesbrough and Spohrer 2006). One component of this service sector is call centers. Call centers and their contemporary successor, contact centers, have become the primary means for the companies to interact with their customers. It is estimated that 70% of the total customer-business interaction takes place through call centers (Mandelbaum 2006). AT&T estimates that about 40% of the total 260 million calls per day placed on its network are toll free calls [AT& T 1998]. Most of these are presumably to the call centers. There were more than 50,000 call centers in US alone with almost 2.65 million workers.[1] Corporate investment in customer management and support is growing at the rate of 8% per annum. In fact, call centers constitute a major part of the entire day- to-day operations for a category of continuously delivered services like insurance, banking & financial services, IT and Telecom related services etc. However, most research on call center focuses on the management of the call center operations efficiently and effectively given the call loads. That includes scheduling call center employees, training them and employing new technologies to improve the efficiencies (See cite…).

Product personalization (and process customization) has become a strategic necessities of the businesses in today's competitive world. From tangible goods like automobiles, to product recommendations, to music, firms are testing and trying different personalization technologies to induce user loyalty, higher willingness to pay, etc. (need citation). Online firms like Google, Amazon, Yahoo! are trying different technologies and ways to personalize the user experience. Similarly, automobile firms like Ford and Toyota offer friendly interfaces through which buyers can design their own cars. Computer vendors such as Dell and Compaq allow customers to configure their own machines online. Levi Strauss and Gap are offering custom fit jeans and apparels for their customers. The goal of the personalization is to increase customer retention, engender loyalty and hence firm profitability. There are large number of papers (both empirical and analytical) which examine the link between personalization and pricing, customer loyalty, and profitability. However, ability to provide personalization creates supply side problems including logistics and distribution, especially for tangible goods. Prior research indicates that customization normally leads to proliferation of product variety which is harder to manage and thus can result in higher operation cost or lower operational productivity. (Zipkin 2001).

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[1] *McDaniel Executive Recruiters'* 2004 North American Call Center Report, 9-23-2004

However, there is no work that we are aware of, that links product personalization with customer service costs.

In the present work, we provide evidence that product personalization can have significant effect on call center demand and performance. In particular, we investigate how product personalization affects customer behavior: their demand for call center services, namely the number of calls made to the call center. The managers of the firm in this study believed that the product personalization efforts increase their customer service costs. The firm has taken explicit measures to standardize its products. However, we argue and then demonstrate that sometimes personalizing products can lead to significant service operation benefits. In our setting, users (or a group of users) can personalize their health insurance policies. For customers to personalize their policies, they need to have significant and repeated discussions with the sales representative of the firm. We argue that such a personalization process for a complex product like a health insurance policy has a flavor of *product co-creation*. Thus, the customers and the firm typically go over the policy details to include or exclude features that fit with the users' needs and amenable to the firm. This process, in turn, leads to a better customer *fit and familiarity* with the product.

Users call to the call center for variety of questions including many questions regarding product features, coverage details etc (the focus of our study). We argue that the process of product co-creation and a better fit and familiarity with a personalized product should reduce product coverage uncertainty. This, in turn, should also reduce the numbers of calls related to product characteristics and coverage.

To test this hypothesis, we collect a rich individual level data set from a health insurance firm. [2] The firm is a large health insurance firm which offers variety of health products to different organizations in the US. In the data set, users (or a group of users) select either standard plans or personalized plans (personalized based on the group requests). In the personalized plans, the users make explicit changes to the policy to fit their needs. To control for various unobserved effects, we follow the group over a period of time such that one set of randomly selected groups make a switch from a standard product to a personalized product, while the other set continues to remain on the same plan. We then capture the detailed call volume data and show that on average, when users move to a personalized plan, their call volume (related to product information in particular) reduce by about 25%. We see no such evidence when users remain on the same standard plan or when they switch from one standard plan to the other. We also find no evidence that this effect is

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[2] Due to disclosure agreements, the firm name will remain anonymous.

short-term. The effect persists for the whole year after switching to the personalized plan. We also show that more frequent callers, reduce their product related call volumes more due to migration to personalized product as compared to the customer groups who make fewer calls. We also find that suspension rates for the claims of customers are not affected by their shifting from standard plans to the personalized ones. This indicates that the robustness of the computer system and processes followed at the firm.

Our study is significant in many ways. First, most studies in manufacturing and service industries have focused on customization - productivity tradeoff. There is no work which has examined the link between customization and customer support (especially call centers). Our study provides an evidence of operational benefit on service operations and customer support. Thus, it highlights how product characteristics can affect customer service costs. Second, our study focuses on service industry, the largest component of US economy. Third, our study is also unique in that we conduct a field study and collect rich individual level actual usage data. The panel nature of the data allows us to control for various unobserved effects providing robust estimates on the impact of personalization.

This paper is organized as follows. In section 2, we provide literature review of the relevant papers in this domain. We describe our study setting in Section 3. Section 4 outlines our theoretical framework. We describe our data, econometric specifications and results in section 5. Finally, in section 6, we conclude and outline future research possibilities and limitations.

2. Related Literature

Our research draws heavily from the literature on customization-productivity tradeoff in operations and production management, in the marketing literature, and in the literature on call center operations.

With increasing competition, firms are forced to aggressively customize goods and services to attract customers, enhance customer perceived value, satisfaction and thus retain them by winning their loyalty. The personalization essentially is to create a product that fits the user needs uniquely. Thus personalization involves customer inputs and integration into product creation, a process named *product co-creation* (Pine 1997, Kahn 1998, Liechty 2001 and Zipkin 2001).

However, customization is not without its cost, as the increased customization leads to proliferation of product variety and thus consequent operation complexity and productivity decrease. The literature in marketing and operations is replete with this notion of productivity -

customization tradeoff. In the manufacturing operation literature, some studies have shown that the product variety leads to loss of operational productivity (Datar 1990, Banker 1990, Macduffie 1996, Fisher 1995 &1999 and Ittner 1995). On the other hand, some other studies have shown the absence of association between the product variety and productivity (Kekre 1990, Foster 1990). The production management theories clearly suggest that larger product variety leads to additional complication of sourcing larger variety of parts, scheduling manufacturing operations for larger variety and consequent higher inventory carrying cost, machine down time, stock out situations etc. The operations literature on manufacturing side however has dealt with the strategies to contain these ill consequences of high product variety viz. flexible manufacturing, product architecture and process standardization (modular product structure, vanilla box method) etc. (Ramdas 2003, Ulrich 1995, Silveira 1998).

The marketing literature however finds product variety a necessity for firms to be competitive in the market place (Frey 1994, McCutcheon 1994). Some studies suggest that firms resorting to product customization would achieve higher customer satisfaction and therefore need to allocate lesser resources for handling returns, reworks, warranties, complaints etc. which may result in lower cost and higher productivity (Crosby 1979, Deming 1982, Juran 1988). However, other studies suggest that increased product variety and attributes lead to increased cost and thus lower productivity (Griliches 1971, Lancaster 1979).

Literature on customization - productivity tradeoff in service industry is even sparser. Most of the studies distinguish fundamental characteristics of services from goods viz. intangibility, perishability (cannot be inventoried), inseparability of production and consumption, and consumer (with heterogeneous preferences) involvement in production (Berry 1980, Lovelock 1996, Shostack 1977, Upah 1980, and Gronroos 1990). Studies suggest that customers with heterogeneous needs and preferences will demand higher customization and thus standardization will be a greater challenge (Anderson 1997). Rust (1996) proposes that service can be broken down in the physical product, service product (warranty, contract etc.), service environment (showrooms) and the service delivery process. He argues that the first three parts are amenable to product design methods but the service delivery part is not and hence the challenges in service customization. However, other studies on service industries emphasize the service delivery process (rather than product) customization as a means to serve different customers (Shostack 1987, Rust 2006). Lovelock (1983) provides a useful classification of services and argues that different categories of services require different operational and marketing treatment.

Most of the research on call center operations has been centered on the capacity management. Variety of analytical queuing models have been developed for operational performance and capacity management at call center with different assumptions on call arrival rate distribution, service time distribution, first come first serve / intelligent call routing , call blocking and abandonment (need citation). Based on these models elaborate staff scheduling / manpower resource management models have been developed. Recognizing that agent turnover has been a major problem at call centers, a body of research has been devoted towards the human resource management issues at call centers. The customer behavior has been studied in the previous research so far but it was in terms of customer impatience modeling / abandonment behavior (Mandelbaum 2006, Mandelbaum 2003).

In summary, the literature suggests that customization, in general, leads to operational complexity for both manufacturing and service operations. As detailed above, many empirical studies have focused on manufacturing industry but very few on the service operations. We also find that although the call center, a complex socio-technical system, has been researched extensively operation management to sociology and psychology, the impact of product personalization on customer service cost has not been studied so far. We fill this gap in literature with our current work. We propose a theoretical framework for analysis of impact of product personalization on customer demand of call center based service (a major cost driver). We then validate this framework on an actual usage panel data in our field study.

3. Research Site

Our study setting is a large health insurance firm in the US. The firm sells several different health insurance policies / contracts (herein after referred to as product) to wide customer base. It serves the customers then through its operational unit. The operational unit performs three broad activities

1. Initial setting up and routine periodic activities - coding customers and product details in the computer system maintaining customer accounts and issuing regular invoices.
2. Call Center Services - Resolving customer's queries through the call center (through telephones calls, emails).
3. Claims Processing – Automatic processing of claims through computer systems (where claims processing logic for different products are coded). Only claims suspended or wrongly processed from computer system are adjudicated / adjusted manually.

Activities 1 and 3 are predominantly automated by coding the benefits and claims processing logic for each product in the relevant information system of the firm. Activity 2 requires customer service representative (CSR) to resolve customer's queries on telephone (and some time via email). CSRs are aided by the information system (like customer and product benefit database, computer telephone integration software etc) which provides customers' insurance product related information directly on their computer screen. However, the CSRs still require knowledge about the product and skills to search for the relevant information on different databases in order to resolve customer query. Activity 2 accounts for about 70% of the total running operational cost (*need more details*).

The firm normally sells health insurance policies to the members of the organization (referred to as client) through the designated group administrator in the organization. Members in the organization, either through their union or through other bodies, apprise the group administrator of their specific needs and accordingly the group administrator negotiates the appropriate policies and prices from the firm. The group administrator organizes members with same chosen product and similar demographic profile (status, annual earning etc.) in one group and thus creates multiple groups within an organization. The firm thus identifies an individual member with his member ID number under a group number and a client number. Therefore, all the members under a group number have subscribed to the same product and usually have similar demographic profiles.

A typical health insurance policy (products) comprises of a set of descriptive (qualitative) and quantitative coverage. Qualitative coverage describes the eligible medical procedures, network of providers, pharmacy, drugs and the explicit exclusion in each one of these. Quantitative coverage specifies the quantitative extent of coverage against each category of descriptive coverage e.g. coinsurance, copayments, deductibles etc. As a result, a typical product is quite comprehensive and complicated (a typical product benefit booklet runs between 70-96 pages). Such complex products are not only difficult for customers to understand but also are equally difficult for the insurance firm to administer. Over the years, the firm has also created hundreds of different products. To overcome this, in recent years, the firm developed an elaborate matrix of standard product coverage components through which a large variety of existing final products can be build (modular product structure). Such final products are termed as standard products. Since these are the existing products, their benefits and claims processing logic are coded in the relevant computer system of the firm and these have been stabilized. Moreover, the CSRs are presumably well aware of these standard product coverage components due to repeatedly answering queries

on the same. However, in order to attract new customers and retain existing customers, sometimes the firm has to make deviations from these standard coverage components to accommodate the specific needs of a group of customers. Such products are termed by the firm as the non-standard products. . These products are essentially "personalized" products where a group of customers request specific changes to be made in "standard" product.[3]

The firm management was of the opinion that the non-standard products are operationally more costly, as these not only require additional upfront cost of coding but also result in higher call volumes, higher call handling time and higher claim suspension rate. As a result, the management took a strategic decision to start a new integrated service operation environment where only limited set of mainly standard products were offered and the customers were persuaded with suitable incentives to self service themselves through web portal. The management had set up a target of 30% higher productivity for this new environment (30% less employee to service per 10,000 customers). The firm gave the 2% reduction in premium as an incentive for customers to migrate to this new service environment.

This new environment was introduced in July 2005 with an objective to gradually migrate the entire general customer base (other than premium customers) to this new environment in 3-4 years. Initially the firm had been successful in persuading the customers to shift from their earlier non-standard products at old environment to standard product at the new environment. However, in order to shift more customers to this new environment, the firm had to introduce new non-standard products at the new environment to accommodate specific needs of customer groups to shift them to the new environment.

3.1 Insurance Selection Process

We conducted interviews with several sales and operational managers of the firm to gain insight in the process of product sales and specifically the process of non-standard products creation. At the time of contract renewal or a new contract, the firm's sales managers offer a set of standard products at tentative prices to the client administrator of the organization. Normally the client administrator negotiates hard on the price and by and large accepts the offered standard products as it is or with minor changes which still fit the standard product coverage matrix of the firm. However, when offered standard products do not provide for certain common medical needs of a group of members, such member groups push hard on the client administrator through their

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[3] We will continue to use the term non-standard and personalized interchangeably.
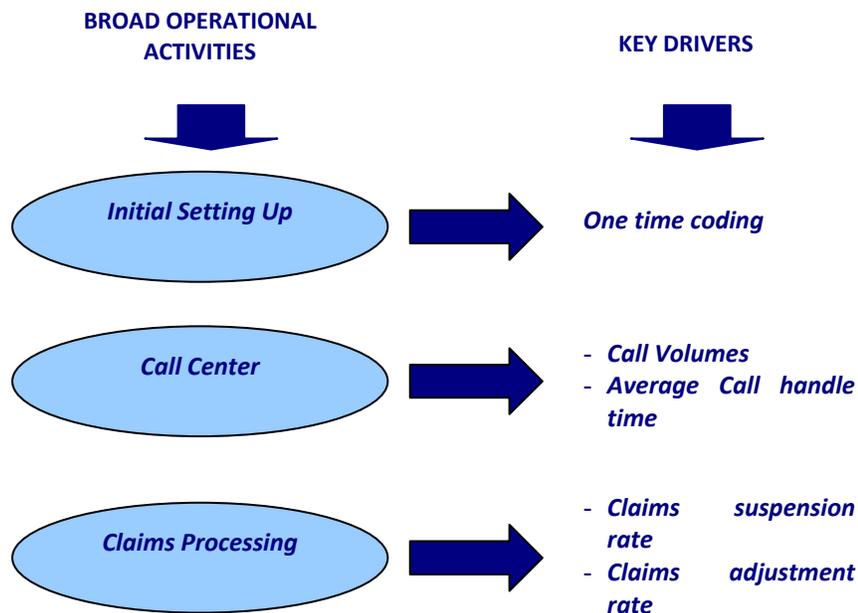
member unions/pressure groups/representatives for its inclusion. This results in a prolonged negotiation between the firm's sales managers and the client administrator. The proposed product agreement reached at each step of negotiation is then discussed internally by the client administrator with member bodies. The firm's sales manager in turn consults the operational managers and product development managers at back end to discuss the operational implications/feasibility of servicing such products. After several such deliberations, the agreement on final product configuration is reached, which often require firm to make deviations from the standard product coverage matrix to accommodate the specific requests of member groups. Such negotiated products are called the non-standard products in the firm. Some examples of such non-standard product creation are - (1) a consortia of school teachers negotiated to incorporate sterilization reversal procedures to be incorporated in their health plan, (2) a university graduate student association pushed to get additional mental health and substance abuse procedures incorporated in their health product etc. (List of some non-standard products created in recent past are given in Appendix B).

In summary, we find that non-standard (personalized) products are created by active involvement of the users and essentially jointly created by the users and the firm (***product co-creation***).

4. Theoretical Framework and Hypotheses

In the present research setting, we examine whether there is any significant difference in operational productivity in administering non-standard (personalized) products vis-à-vis the standard products. We first identify key operational productivity / cost drivers in present operational set up as given in Figure 1

Figure 1: Key operational Cost Drivers

BROAD OPERATIONAL ACTIVITIES	KEY DRIVERS

Initial Setting Up → *One time coding*

Call Center →
- *Call Volumes*
- *Average Call handle time*

Claims Processing →
- *Claims suspension rate*
- *Claims adjustment rate*

These operational cost drivers were identified by examining the impact of the product category for each of the three operational activities as below –

- **Initial Setting up Activity** - One time *coding time / cost* for a new personalized product in the computer systems.

- **Call Center Activity** – *Call volumes* received for each category of product and the *average call handling time* for responding to such queries by the CSR.

- **Claims Processing Activity** - *Claim suspension (auto-adjudication failure) rate* and the *claims adjustment rate* for each product category. In the event of either failure of claims auto-adjudication or correct adjudication on computer system, additional time (cost) of manual claims adjudication / adjustment is required.

One time additional coding time (cost) for a new product is fixed and it is fairly straight forward to estimate. However, the other cost drivers are the result of complex interactions among people (both customers and CSRs), products, processes and technology (computer systems). In the present work, we face the challenge of controlling for customer heterogeneity, CSR heterogeneity and the process differences in the old and new environment (The computer systems remain the same in new and old environment).

We argue that controlling for other things, the identified productivity drivers are manifestation of interaction of product with the different entities involved in the service delivery operation as represented in the conceptual framework in Figure 2.

Figure 2: Product Entity Interaction
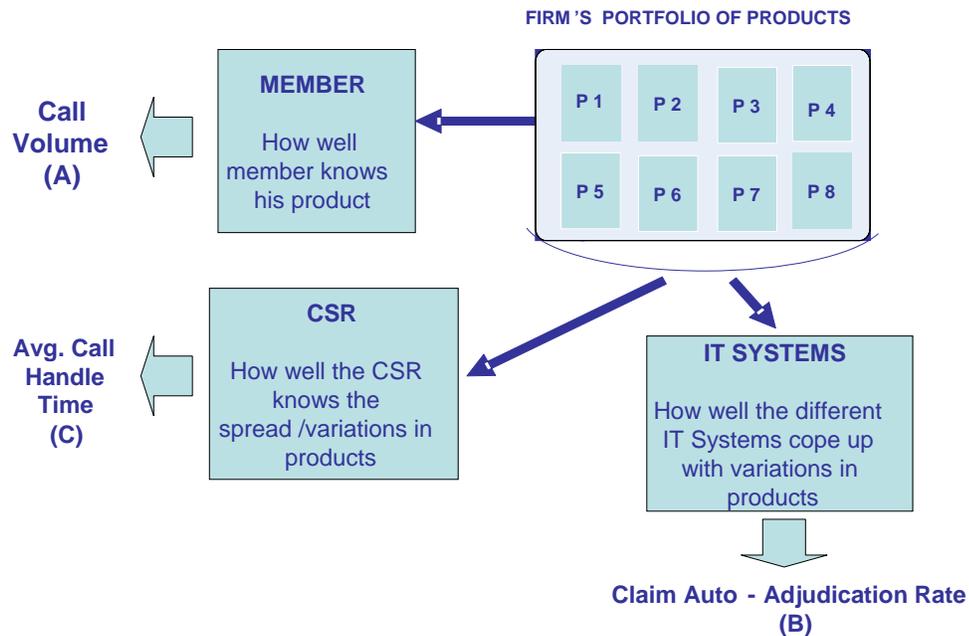
In this paper, we will focus on call volume (A) and, to an extent, on claim adjudication rate (B) and how they are affected by product personalization. While average call handling time could also be a function of product personalization, the firm, unfortunately, does not keep details on the time takes to respond to calls made by each customer. However, we had detail conversations with the CSRs and they believe that there is no difference in the time taken to respond to a standard product related call as opposed to personalized product related call. Nonetheless, in this paper, we cannot verify their conjecture.

Claim adjudication rate (B) depends on how correctly the information system is coded. Computer Systems are useful in efficient administration of a complex product like health insurance product, as it not only reduces CSRs' average call handle time by displaying the requisite product related information to CSR on his computer screen readily but also automates the standard repetitive activities and thus save precious man hours to boost operational productivity. In the present setup this is achieved by coding the product benefit and claims processing logic in the computer system. Claims processing operation specifically requires the collation of product benefit related

information from customer, facility (health provider), and drug information from several other databases. Since the non-standard product requires adding new code for the product related benefit and the claims processing logic, the probability of claims suspension in case of non-standard products is considered to be higher than the already developed standard products.

The key focus of this paper is customer call volume (A). Mostly customers call because of the difficulty experienced by them in understanding their product benefits /coverage and due to the operational process failure or delay (claims rejection, issue of inaccurate invoice or ID card etc.). For the analysis in this paper, we only include the calls categorized as product related calls. Calls received at the call canter are categorized on the basis of its reasons – coded into a total of 164 reason codes. The CSRs allocate reason codes to each received call. Simple analysis of call volumes on reason codes suggested that about 48% of the total calls belong to product coverage related enquiries i.e. enquiries regarding coverage of medical procedure, facility, providers, pharmacy or drugs. The other reasons for calls were quite fragmented and were generally the failure or delay in the delivery of services by the firm e.g. failure in timely claims processing, ID card dispatch etc. We focus on product coverage related calls as explained below.

We held extensive discussions with the CSRs, operational managers at the call center and some client administrators to understand what triggers product coverage related calls from customers. We also randomly listened to a large number of live calls to understand the contents of the product coverage related calls (Comprehensive list of the most frequently received product coverage related calls at the call center are compiled in Appendix A). Most of the product coverage related calls were namely "My doctor has prescribed ----- and I was told that my plan does not cover it / is it covered under my plan?"; "I thought my plan allowed for --- specialist visits but I was told otherwise / How many specialist visits do I have in my plan?"; "What are my co-pay for out of network --- treatment?", "What are my generic drug coinsurance rate / co-pay?". We observe that these calls are triggered at the time of consumption of insurance product by the customers. At this time, customers are made aware of their instant medical needs and then they assess whether their insurance products provide for such medical needs or not. If such medical needs are satisfactorily met by their product, customers do not need to call. When such medical needs are not met by their product adequately or they are uncertain about it, the customers call the call center. The failure of product to provide desired coverage can be attributed to the lack of fit between the product coverage and customer's medical needs. The uncertainty in customers about their product coverage can be attributed to customers' lack of familiarity of their product coverage.

As we noted earlier, personalized products are created by the process of product co-creation. Both users and firms are actively engaged in creating such a product. Von Hippel (1998) introduced the idea of shifting the locus of product development towards customers if the agency-related cost in extracting their personal preferences is very high. Such product development by customers are done by "trial and error" and "learning by doing" in multiple steps. Traditionally manufacturers explored what users want and then develop responsive products. Von Hippel (2002) however argued alternative approach where manufacturers abandon the attempt to understand user needs in favor of transferring need related aspects of product and services to users in form of a toolkit to create the product themselves. User toolkits / product configurators for product innovation further gained popularity with advances in internet and web technologies, as it became cheaper and faster for firm's to allow product personalization by customers. Mass customization literature also recognizes elicitation or finding exactly what customer wants as the most crucial element of mass customization (Zipkin 2001). The literature suggests that the personalized / user designed / co-created products should match users need better and thus it should lead to higher satisfaction, higher customer loyalty and lesser occasions of required reworks, returns and warranty cost (Kahn 1998). We now argue that they should also lead to fewer customer calls.

To crystallize this notion and help derive out hypothesis, we now formally model this process.

4.1 Model and Hypothesis

When a medical need arises, consumers typically visit providers/facility. If the medical needs are met by their chosen insurance products, customers are satisfied and they have no reason to make product coverage related calls. However, if customers' medical needs are either not completely met by their product coverage and/or they are uncertain about it – they have the incentives to call and clarify their coverage. This lack of fit (insurance does not cover their needs) or uncertainty about the features results in customer disutility and customers making product coverage related calls to the firm's call center.

All else equal, the higher the disutility, the higher is a chance that the user will call the call center. So conditional on customer i having a medical need j, the probability that the makes product coverage related call at time t can be expressed as

$$P_{it} = \sum_{j=1}^{K} P(du_{ijt} < \underline{U}) \cdot S_{ijt}$$

Where du_{ijt} is the disutility to customer i due to mismatch between his relevant product coverage and his medical needs j that arose at time t, S_{ijt} is the probability a medical need j arises for customer i at time t. Thus S_{ijt} indicates the salience of medical need j for customer i. K are the potential medical needs, and $\underline{U}$ is the threshold such that a user will call if the utility decreases below $\underline{U}$. We can write the dis-utility due to mismatch in a standard Cobb Douglas form as –

$$du_{ijt} = a \times (misfit_{ijt})^{\beta}$$
$$\ln(du_{ijt}) = A + \beta \ln(misfit_{ijt})$$

Without loss of generality, customer's potential medical needs K can then be arranged corresponding to these K coverage components. Each medical need may require more than one product coverage. For example, a medical need may require coverage in radiology as well as heart related procedure. The fit between a medical need j and the relevant coverage component is determined by the following –

1. Extent of match between the medical need j and the relevant product coverage component. If medical need j requires coverage into multiple categories, then let $x_{ij} = \sum_{k} x_{ik}$ capture the distance between the medical need and the coverage available for that need under the chosen insurance plan. Higher the x, more is the mis-fit.

2. Customer's uncertainty (lack of understanding) about his relevant product coverage for need j. We denote this as b_{ijj} on a scale of 0 to 1, where no uncertainty (perfect understanding) is 0 and complete uncertainty (perfect lack of understanding) is 1. b_{ijt} captures the customer's perception of fit of his product coverage with his medical needs at time t.

So the **misfit** between the customers i's medical need j and his relevant product coverage component at any time t can be expressed as

$$misfit_{ijt} = b_{ijt}(1 + x_{ij})$$

x_{ij} is metrics for the actual fit between the needs j and the coverage provided. Higher the x_{ij}, higher is the misfit. b_{ijt} indicates how clearly the customer understands this coverage.

Substituting this back

$$du_{ijt} = A + \beta ln\left(b_{ijt}(1 + x_{ij})\right)$$

Recall that the probability a consumer calls is

$$P_{it} = \sum_{j=1}^{K} P(du_{ijt} < \underline{U}) \cdot S_{ijt}$$

Now consider the migration of the customer from a standard product to personalized product.

Without loss of generality, let's assume that one feature $\hat{k}$ of the product is personalized. Probability of call by a consumer who is using personalized product is

$$P_{it}{}^{per} = \sum_{j=1}^{K-1} P(du_{ijt} < \underline{U}) \cdot S_{ijt} + P(du_{i\hat{k}t}{}^{per} < \underline{U}) \cdot S_{i\hat{k}t}{}^{per}$$

Where

$$du_{i\hat{k}t}{}^{per} = A + \beta ln\left(b_{i\hat{k}t}{}^{per}(1 + x_{i\hat{k}}{}^{per})\right)$$

If $\hat{k}$ is not personalized (standard) then

$$P_{it}{}^{std} = \sum_{j=1}^{K-1} P(du_{ijt} < \underline{U}) \cdot S_{ijt} + P(du_{i\hat{k}t}{}^{std} < \underline{U}) \cdot S_{i\hat{k}t}{}^{std}$$

Where

$$du_{i\hat{k}t}{}^{std} = A + \beta ln\left(b_{i\hat{k}t}{}^{std}(1 + x_{i\hat{k}}{}^{std})\right)$$

Personalization process consists of a group of customers with common medical needs (say $\hat{k}$) asks for either modification of corresponding product coverage or inclusion of one (if it does not exist). The inclusion/modification of product coverage should result in a better fit, or reduction in x corresponding to common medical needs. Put another way, we expect $x_{i\hat{k}}^{per} < x_{i\hat{k}}^{std}$. Second, the process of personalized product creation entails multistep negotiation between the firm and the member group. This should reduce the uncertainty about the product coverage corresponding to the medical needs or ($b_{i\hat{k}t}{}^{per} < b_{i\hat{k}t}{}^{std}$). Finally, we also expect that users are more likely to personalize features that are very salient to them. These medical needs are more probably to occur and/or they are more important. Thus probability $S_{i\hat{k}t}^{per} = S_{i\hat{k}t}^{std}$ is likely to be higher for personalized medical need. Therefore, reduction in x and b is likely to have a higher impact on probability of calls when S is also high.

Based on this discussion, we hypothesize that

H1: Customers migrating from standard product to personalized product reduce their product coverage related calls.

Firm is consolidating its assortment of products by discontinuing some of the less popular products and persuading the customers to pick up its standard product offerings. Therefore, due to firm's persuasion / incentives, some customers may migrate from personalized product to one of the standard offerings of the firm. Again, suppose that the feature $\hat{k}$ which was personalized earlier, is now standardized. It is intuitive that

1. Lack of personalization is likely to decrease the fit. So $x_{i\hat{k}}$ is likely to increase.

2. Since the customer i is somewhat more involved in product change deliberations now, we may expect customer familiarizes himself/herself with the coverage related to $\hat{k}$. Thus $b_{i\hat{k}t}^{std}$ is likely to be lower after a transition from personalized to standard then when the transition is from standard to standard or no transition.

Thus in such migration, we see that the value of b_{ik} is likely lower but the fit $(1+x_{ik})$ is likely to be worse (higher x). So the change in probability of calls is more ambiguous.

Our model also offers insight into how customers with different call intensities will respond to change in product coverage. Let us assume two consumers A and B have migrated from a standard product to the personalized product by personalizing a need $\hat{k}$. Suppose customer A is a heavy caller compared to customer B ($S^A > S^B$). If we assume x and b reduce equally for both A and B, it is immediate that, due to higher S^A, the reduction in number of overall calls will be higher for a higher intensity caller A than for B.

5. Data and Methodology –

Our goal is to examine how migration of a user from a standard plan to personalized plan affects his (her) calling behavior. While we have the data at individual level, since users typically make very few calls (less than 0.2 calls per month), we aggregated the data at the group level. Thus a group is a collection of individuals within an organization that sign up for the same plan. Typically these groups have demographically similar users. We identified groups that changed their products from standard to personalized and vice versa. As we mentioned earlier, the firm has been trying to move its customers to a new environment. The new environment went operational in June 2005. Initially, the firm picked the customers it wanted to move to the new environment by giving them incentives. After about 6 months, it had moved more than 250,000

such customers. By July 2006, the new environment was stabilized and all groups (not specially selected) were encouraged to migrate to the new environment. Thus this time-frame was appropriate for our sample. We could find a large number of groups switching or new environment with and without personalized plans. Therefore, we could get a reasonably large number of customers group changing products only along with the change in the environment.[4] We should note that these personalized products were specifically created for these customer groups.[5]

We captured migration of customer groups to new environment with all possible change in broad product categories namely standard (S)→ non-standard (NS), non-standard → standard, one type of standard → another type of standard and customers who did not change their product at all. Normally the insurance contracts are given on annual basis from July - June and January - December. We selected July – June contract cycle, and selected the groups which have migrated to new environment in July 2006. We then randomly selected the following categories of customer groups who have changed the product and or environment in July 2006 but maintained the same product for each contract periods July05-June06 & July06-June07 –

- *S→NS Category* – 170 separate customer groups of different sizes who migrated from standard product at old environment (1st July 2005 to 30th June 2006) to non-standard product at new environment (1st July 2006 to 30th June 2007).

- *NS→S Category* – 35 separate customer groups of different sizes who have migrated from non-standard product at old environment (1st July 2005 to 30th June 2006) to standard product at new environment (1st July 2006 to 30th June 2007).

- *No product change (Standard) Category* (*Sim S→S*) – 66 separate customer groups of different sizes who have migrated from standard product at old environment (1st July 2005 to 30th June 2006) to the same standard product at new environment (1st July 2006 to 30th June 2007).

- *Dis S→S Category* – 34 separate customer groups of different sizes who have migrated from one type of standard product at old environment (1st July 2005 to 30th June 2006) to another type of standard product at new environment (1st July 2006 to 30th June 2007).

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[4] We could potentially go back to earlier times to collect a sample where users changed the plans but the environment was unchanged. Unfortunately, the definition of standard and non-standard was fairly vague within the firm.

[5] Sometimes, the firm converts a personalized product into a standard product after some time.

- **S→S Category** but **no environment change (Old S_S)** – 458 separate customer groups of different sizes who have remained on the same standard product in the old environment for the entire period 1st July 2005 to 30th June 2007.

Sometimes, a small number of customers keep joining and/or leaving the groups in the middle of the year, and thus the membership count of each group varies somewhat during the period of study. However, in our selected samples, such changes were below 10% of the group size. To account for these changes, we also collected the monthly membership counts for each selected group for the entire period of study. The summary statistics for the category wise member counts for groups is –

Table 1: Category wise member counts for groups

Category	Number of Groups	Mean	Std. Dev.	Min	Max
NS_S	35	80.71	120.27	0.63	558.67
S_NS	170	25.14	30.80	0.92	233.42
Sim S_S	66	49.79	71.67	0.5	371.38
Dis S_S	34	54.84	73.70	0.71	381.13
Old S_S	458	19.44	33.36	0.75	377.13

The call volumes data for each group of customers were collected from the Automatic Call Distributor (ACD) of the call center. Customer calls are classified in about 164 different reason codes by the firm. We first club these call types into two broad categories –

- Calls pertaining to the general product coverage information viz. medical procedures, drugs and providers participation etc.
- Calls not pertaining to product related information viz, ID card enquiry, verification of account status etc. These calls are mainly arise due to some process failures or delays.

Since we are interested in understanding how the call volumes change due to customizing the product to fit the needs of the customers, we only focus on general product coverage related calls by the customers. These calls account for 48% of the total call volumes. We also noticed that in the new environment, the firm widened the definition of product related call by subsuming some of the reason codes into the reason code for general product coverage enquiry. Therefore, in general, the number of product related calls increased in the new environment due to recoding. There is no reason to believe that this recoding was systematically biased towards any particular migration.

We collected weekly general product coverage related calls data for each of the selected groups under different categories for the entire period. The summary statistic for weekly product related call volumes aggregated over the groups in each category and normalized over 5000 customers is given below. Normalization is done over 5000 customers to highlight the dispersion in changes in call volumes.

Table 2: Category wise weekly product related call volumes normalized over 5000 members

Category / Environment		Obs	Mean	Std. Dev.	Min	Max
NS_S	Old Env	53	21.17	7.65	5.73	47.46
	New Env	52	24.98	7.83	10.15	37.56
S_NS	Old Env	53	28.20	9.12	3.33	50.7
	New Env	52	27.66	7.81	9.18	47.27
Sim S_S	Old Env	53	28.31	8.51	4.41	54.78
	New Env	52	32.68	8.71	14.29	48.12
Dis S_S	Old Env	53	21.02	7.17	5.26	37.3
	New Env	52	30.36	8.81	14.03	48.31
Old S_S	Old Env	53	24.13	4.88	13.73	34.38
	Old Env	52	22.12	5.45	9.5	35.47

From the above table, it is apparent that the mean weekly product coverage related call volumes is decreasing for migration from standard to non-standard products whereas for all other types of migrations, these mean weekly product coverage related call volumes are increasing. This suggests the reduction in call volumes with customization of product.

We plot the trends of weekly product coverage related call volumes) for categories which migrate with product change along with the category migrating without change in product. This gives the pictorial view of trends in call volume changes with different categories of change in product vis-à-vis without change in product. The plot below shows the weekly call volume for the users who migrate from standard to non-standard and for the users who remain on the same plan. There seem to be significant weekly variations. However, there seems to evidence that, on average, migration to personalized plans reduce the call volume.

Figure 3: Comparison of weekly call Volumes trends for S_NS and Sim S_S normalized over 50 members
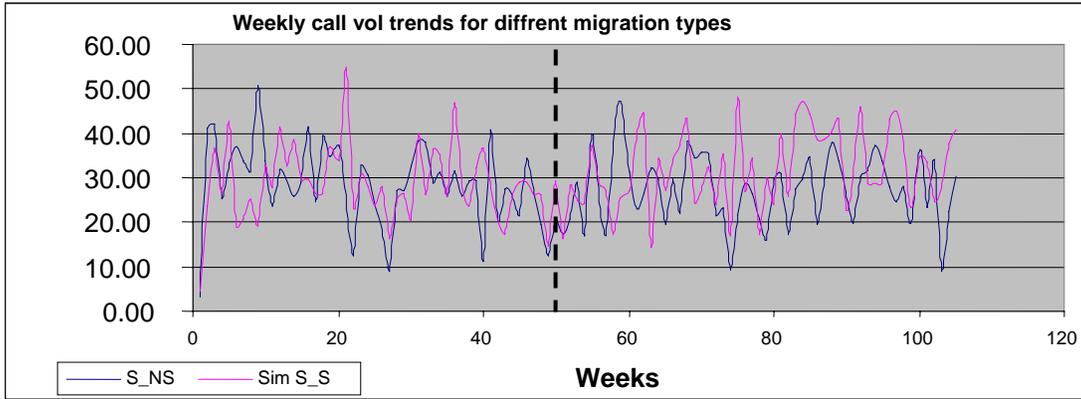
5.1 Methodology

Our goal is to identify how change in product choice affects the customer call volume. However, in our case, change in product is also associated with the change in environment. There is also customer related heterogeneity. Thus, we need to weed out the effect of customer related heterogeneity, environment related heterogeneity and any time trends or seasonality on call volumes. We design the following experiment to achieve this. We have a category of customer groups changing their product with change in environment (called Treatment Group) and a category of customer groups changing the environment with the same product (called Control Group 1). There is another category of customer groups that neither changes their product nor their environment (called Control Group 2). We first aggregate weekly call volumes for all the groups under each category separately and then normalize it for 5000 customers for each category. We propose the following difference-in-difference experimental design for analysis.

	Old Environment	New Environment	
Treatment Group	**Call Vol (S)**	**Call Vol (NS)**	} Product Effect + Environment Effect + Time Effect
Control Group I	**Call Vol (S1)**	**Call Vol (S1)**	} Environment Effect + Time Effect
Control Group II	**Call Vol (S2)**		} Time Effect

We subtract the weekly call volumes of Old S_S category for each week from the corresponding weekly call volumes for S_NS category and SIm S_S category to weed out any general time trends from them.

Figure 4: Experimental Design 1 (Model A)

	Old Environment (t=1,53)	New Environment (t=54,105)	
Normalized 5000 members Treatment Group	**Call vol (S) – (S2)**	**Call Vol (NS) – (S2)**	} Product Effect + Environment Effect
Normalized 5000 members Control Group	**Call Vol (S1)- (S2)**	**Call Vol (S1)- (S2)**	} Environment Effect

We run the pooled OLS regression on the diff-in-diff-in-diff model (Model A) by pooling the call volumes for the entire t= 105 weeks of the observation period (53 weeks in the old environment and 52 weeks in the new environment)

$$Cvol_t = \beta_0 + \beta_1 (Tg)_t + \beta_2 (En)_t + \beta_3 (Tg)_t \times (En)_t + \beta_4 T + \varepsilon_t \qquad -------- \quad (A)$$

Where

Callvol $_t$ = Aggregated weekly product related call volumes

Tg = Dummy for the treatment group

En = Dummy for the environment

T = Monthly time dummies[6]

The sign of the coefficient of interaction term Tg*En gives the net effect of product change on the product related call volume in this model. Although this model weeds out the effect of environment and time to find the net effect of change in product on call volume, it still may suffer from aggregation problems. For example, it is possible that the result might be driven by changes in call volumes of only few groups. Moreover, one would expect the call volumes made by a group over different weeks to be correlated which the above model ignores.

To overcome these problems, we next take the disaggregated call volumes for each group of customers under each category separately. We estimate run fixed effect estimation (at a group level). This allows us to weed out groups specific unobserved effects. We first aggregate the call volumes for each group under each category for the entire year before and after the change in environment and then generate monthly call volume by dividing aggregate call volumes by 12. We do this to provide an easy comparison with other estimates. Disaggregating at monthly level only changes the scaling. We then run the fixed effect estimation on the experimental design 2 as shown below.

Figure 5: Experimental Design 2 (Model B1)

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[6] Technically we do not need to include time dummies as we have subtracted the time effect. However, to be on conservative side, we include monthly time dummies to capture any seasonal variation in calling pattern.

$$Cvol_{it} = \beta_0 + \beta_1(Tg)_{it} + \beta_2(En)_{it} + \beta_3(Tg)_{it} \times (En)_{it} + \beta_4 Mcnt_{it} + \gamma_{it} + \varepsilon_{it} \quad ---- \quad (B1)$$

Where

i = index for customer groups

t = index for time period for which the variables are recorded

$Cvol_{it}$ = Avergae product related call volumes for group i in time period t

$Mcnt_{it}$ = Average member counts for group i at time period t

Tg = Dummy for the treatment group

En = Dummy for the environment

γ_i = Group fixed effects for group i invariant over time

ε_{it} = Idiosyncratic error term

The coefficient of interaction term Tg*En gives the net effect of product change on the product related call volume in this model

While Averaging call volumes for the entire contract year helps avoid the serial correlation problem in the idiosyncratic error term for the group over period of study (24 months or 105 weeks) (Mullainathan, 2003), in aggregating the data over the year, we lose the variations in call volumes over time for each group.

Therefore, we disaggregate the time dimension also. We take the monthly call volumes and the monthly member counts for each group of customers under treatment group and the control group. We run the fixed effect estimation on the experimental design 3 as below.

Figure 6: Experimental Design 3 (Model B2)

$$Cvol_{it} = \beta_0 + \beta_1(Tg)_{it} + \beta_2(En)_{it} + \beta_3(Tg)_{it} \times (En)_{it} + \beta_4 Mcnt_{it} + \beta_5 T + \gamma_{it} + \varepsilon_{it} \qquad \text{(B2)}$$

T stands for the monthly time dummies. These are included to account for any seasonality in the call volumes. In this model, we use cluster robust standard errors to account for both heteroskedasticity and any form of serial correlation in the idiosyncratic error terms across time.

6. Results and Discussions

We estimate these three models with S_NS groups as treatment group and Sim S_S as control group. So in the control group, member groups strictly remain on the same standard product after migration to the new environment and thus their call volume strictly changes due to time trends and environment only. The results are given in Table 3.

Table 3: Change in product related call volumes due to migration from standard product to personalized product (standard errors in parentheses)

S_NS Group AND Sim S_S Group	Model A (Pooled OLS on category wise aggregated weekly call volumes normalized over 5000 customers with robust standard errors)	Model B1 (Fixed effect estimator with call volume aggregated over the contract year for each group separately)	Model B2 (Fixed effect estimator with monthly call volume for each group and cluster robust variance estimation)
Tg	-0.104 (1.64)	dropped	dropped
En	6.38*** (1.65)	0.204*** (.07)	0.21*** (0.07)
*Tg*En*	*-4.92** (2.34)*	*-0.207*** (0.078)*	*-0.219*** (0.08)*
Mcnt	Not applied	| 0.022*** (0.003)	0.015*** (0.003)
T	Applied	Not applied	Applied
Constant	4.18*** (1.16)	0.143 (0.12)	0.307**(0.13)
N	210	2 observations each for 236 groups	24 observations each for 236 groups
Adj R Squared	0.08	0.69	0.43

Note - ***, **, * = statistically significant at the 1%, 5% and 10% levels (two-sided test) respectively

The results in all the three models show a negative and highly significant coefficient for the interaction term. This signifies that controlling for other things; customers going from standard to personalized (non-standard) products make statistically lesser calls per week regarding their coverage / benefit information. This result is also robust to the aggregation problem and any group level unobserved effects, as all the specifications give negative coefficient of interaction term with high significance. Thus we find support of our hypothesis. Not only are these effects statistically significant, they are also economically significant. Based on the mean numbers, these estimates suggest that moving to personalized products reduces the call volume on the order of 18% to 27%. This is a significant drop. Even if only 10% members were to be on personalized policies (Firm has 3 million users), a quick back of the envelop calculation suggests that this translates into about 60 fewer calls per day. (**need more details**)

One concern with this analysis could be that simply change of plan induces these effects (it may not be due to personalization). To account for this, we include in our control group the users who change from one standard plan to another. The results of this experiment for all three models are shown in Table 4.

Table 4: Change in product related call volumes due to migration from standard product to personalized product with Dis S_S as control group (standard errors in parentheses)

S_NS Group AND Dis S_S Group	**Model A** (Pooled OLS on category wise aggregated weekly call volumes normalized over 5000 customers)	**Model B1** (Fixed effect estimator with average monthly call volume aggregated over the contract year for each group separately)	**Model B2** (Fixed effect estimator with monthly call volume for each group and cluster robust variance estimation)
Tg	7.19*** (1.7)	dropped	dropped
En	11.35*** (1.71)	0.38*** (0.1)	0.37*** (0.14)
*Tg*Pt*	*-9.89*** (2.42)*	*-0.38*** (0.11)*	*-0.38*** (0.14)*
Mcnt	Not applied	-0.024*** (0.004)	0.018*** (0.008)
T	Applied	Not applied	Applied
Constant	-3.12*** (1.20)	0.072 (0.14)	0.25 (0.24)
N	210	2 observations each for 204 groups	24 observations each for 204 groups

Adj R Squared	0.18	0.61	0.36

Note - ***, **, * = statistically significant at the 1%, 5% and 10% levels (two-sided test) respectively

The results are even stronger than the earlier specification, which further supports our hypothesis that customers shifting to personalized product make lesser product related calls due to this change.

In order to further test our theoretical framework, we run the experiment with Dis S_S group as the treatment group and Sim S_S group as the control group. The intention here is to show that the factors of fit and familiarity are likely to be similar in customers opting for standard products whether they remain on the same standard product or they change from one standard product to another. The results of this experiment are shown in Table 5.

Table 5: Change in product related call volumes due to migration from one type of standard product to another (standard errors in parentheses)

Dis S_S Group AND Sim S_S Group	**Model A** (Pooled OLS on category wise aggregated weekly call volumes normalized over 5000 customers)	**Model B1** (Fixed effect estimator with average monthly call volume aggregated over the contract year for each group separately)	**Model B2** (Fixed effect estimator with monthly call volume for each group and cluster robust variance estimation)
Tg	-4.10*** (1.37)	dropped	dropped
En	3.80*** (1.38)	0.23*** (0.08)	0.21*** (0.07)
Tg*Pt	***1.99 (1.95)***	***0.13 (0.14)***	***0.17 (0.15)***
Mcnt	Not applied	0.003 (0.005)	0.021*** (0.002)
T	Applied	Not Applied	Applied
Constant	1.99** (0.97)	1.07*** (0.29)	0.14 (0.12)
N	210	2 observations each for 100 groups	24 observations each for 100 groups
Adj R squared	0.13	0.64	0.52

Note - ***, **, * = statistically significant at the 1%, 5% and 10% levels (two-sided test) respectively

We find insignificant coefficient of the interaction term in all three specifications, which clearly points that there is no evidence of change in product coverage related call volumes when the

customers change from one standard product to the other. This further validates our theoretical framework that the fit and familiarity factors determine the generation of product coverage related calls from the customers.

We further check what happens when the customers shift from non-standard (personalized) products to the standard offerings. Normally the customers group do so if they find that the incentives (financial or others) to shift to the standard product from personalized one offsets the expected loss due to such change. As we had noted in the model section, it is hard to hypothesize the direction of this change. On one hand, the fit may go down but on the other hand, the familiarity may not suffer. So we empirically test this effect using the NS_S group as the treatment group and the Sim S_S as the control group and run all three models. The results for the same are shown in Table 6.

Table 6: Change in product related call volumes due to migration from personalized product to standard product (standard errors in parentheses)

NS_S Group AND Sim S_S Group	Model A (Pooled OLS on category wise aggregated weekly call volumes normalized over 5000 customers)	Model B1 (Fixed effect estimator with average monthly call volume aggregated over the contract year for each group separately)	Model B2 (Fixed effect estimator with monthly call volume for each group and cluster robust variance estimation)
Tg	-7.14*** (1.55)	Dropped	dropped
En	6.38*** (1.55)	0.206** (0.08)	0.21*** (0.07)
*Tg*Pt*	*-0.560 (2.2)*	*0.025 (0.15)*	*0.058 (0.15)*
Mcnt	Not applied	0.02*** (0.004)	0.015*** (0.004)
T	Applied	Not Applied	Applied
Constant	4.18 (1.09)	0.099 (0.24)	0.22 (0.27)
N	210	2 observations each for 101 groups	24 observations each for 101 groups
Adj R squared	0.26	0.76	0.51

Note - ***, **, * = statistically significant at the 1%, 5% and 10% levels (two-sided test) respectively

We find no evidence that call volume goes up significantly when users move to standard products from personalized products.

Our second hypothesis is that change in the call volume will be higher for high volume callers. To test this, we sort the S_NS groups in decreasing call intensities (call volumes per member per month) and then categorize them in four categories (1) top 25% of groups as treatment group 1(Tg1), (2) next 25% of groups as treatment group2 (Tg2), (3) next 25% of the groups as treatment group 3 (Tg3), and (4) lower most 25% groups as treatment group as treatment group 4 (Tg4). We run experimental design 2 (model B2) with 4 treatment groups and Sim S_S groups as control group. The results are given in table 7.

Table 7 – Differential product related call volumes reduction for groups with different call intensities (standard errors given in parentheses)

S_NS Group and Sim S_S Group	Model B1
Mcnt	0.023*** (0.004)
En	0.20*** (0.06)
Tg1*En	-0.52*** (0.10)
Tg2*En	-0.21** (0.10)
Tg3*En	-0.08 (0.10)
Tg4*En	-0.01 (0.10)
Constant	0.09 (0.12)
N	2 observations each for 236 group
R Squared	0.67

Note - ***, **, * = statistically significant at the 1%, 5% and 10% levels (two-sided test) respectively

We see that the coefficients of the Tg1*En and Tg2*En are both highly negative in magnitude and statistically significant as compared to the coefficients of Tg3*En and Tg4*En. This indicates that the customer groups with high call intensities before the change in product have reduced the product related call volumes more with migration from standard to personalized product as compared to the customer groups with lower call intensities. This result supports hypothesis 2.

We also test the impact of migration from standard product to personalized product on the claim suspension rates of customer groups. Since our objective is to see how the product category affects the claim suspension rate at the firm, we use experimental design 1 (model A) to run

pooled OLS regression on weekly claims suspension rate for the S_NS groups vis a vis Sim S_S groups. The results are given in Table 8.

Table 8: *Change in claims suspension rate with change in products from standard to personalized product (standard errors given in parentheses)*

S_NS Group and Sim S_S Group	Model B1
Tg	1.37*** (0.51)
En	-0.12 (0.87)
Tg*En	-0.31 (0.73)
Constant	15.04*** (0.74)
N	210
R Squared	0.13

Note - ***, **, * = statistically significant at the 1%, 5% and 10% levels (two-sided test) respectively

We see an insignificant coefficient of Tg*En, which indicates that the claim suspension rate for the customer groups does not change statistically significantly by the change in their product from standard to personalized. This indicates that once the personalized products are coded in the relevant computer systems of the firm, the computer systems and processes at the firm are robust enough to handle both standard and the personalized product equally well.

 (*need more details**)

7. Conclusions, Managerial Implication, Limitations and Future work

We show using actual usage data in a field study that personalizing a complex product like a health insurance has a significant impact on cost to serve the customer. We provide the theoretical framework for the same by proposing that the factors of fit and familiarity determine the product related call volumes to the call center. We find that customers migrating from the standard offerings to the customized product make 25% fewer product related calls due to this change. This is both economically and statistically significant. Application of this framework could be very beneficial for such service industries, as call center operations constitute a large part of the total operation cost and product related calls are the major portion of the total calls received in such call centers.

Our study contradicts the prevalent beliefs of the managers in the firm even thought our framework of fit and familiarity clearly outlines this result. A key contribution of our paper is that it provides a direct link between the customer service operations and product personalization. Unlike most of the literature which so far has only talked about the customization-productivity tradeoff, possible benefits of product customization on operations side has not been much researched. Our study shows that at least one major cost driver of the service cost is reduced by customizing the product to meet customers' needs. We need more research to account for the other cost drivers to get the net effect of product customization on the overall operational cost. However, in complex service products where the products are predominantly serviced through the computer systems, the possibility of reduction in operational cost with product customization cannot be denied. Moreover, most of the studies on call center talks about the work force resource planning etc given the customer consumption load. We believe that our study goes a step further and traces the causes of call volume generation in a call center and thus gives important insights to the mangers for effectively reducing the load on call center rather than suggesting how to better manage the given load. (**need more details**)

From our interviews with the field managers of the firm, we found that the product customization (non standard product creation) is achieved by effectively integrating (directly or indirectly) the customers in co-creation of product. The firm's managers communicate with the customer groups through the client's group coordinator to understand their needs and then select the most suitable product from among the standard offerings and modify it to fit customers' needs. In this process the managers also help customers understand what product coverage suits their needs best and thus familiarize the customers with their product coverage. Thus we find that the customization process starts with the customer pull and then finishes with the firms push. The process of customization here essentially follows the three elements of mass customization [Zipkin 2001]. (1) It starts with elicitation of customers needs clearly. (2) Then the closest standard product that matches customer needs is identified and further required modification in standard product is determined. In this process the technical and financial feasibility of such changes are also evaluated. (3) Finally the required adjustments in the operations to service such customized product are affected. The present research shows that the customization process, if handled systematically, can reduce the product related call volumes. We thus feel that our current work shows not only the result and its cause but also the process through which this result is achieved. Thus it has a lot of informative value for the practicing managers.

need more details

Our work has only analyzed the customer- product interaction. One possible future extension of our present work is empirically testing the interaction of product with other entities in the service operations namely firms resources - CSRs and computer systems. This analysis would give the overall customization-productivity relation. It may be possible that the average call handle time for calls from the customers with customized product may be larger than the calls from customers with standard product. Moreover, we have taken only one year period before and after the change of product. One may argue that the product familiarity due to deliberations at the change process may wear off after some time and therefore the call volumes may then increase. We feel that the familiarity with the product should increase with more experience with the product but still the analysis on a larger time frame may further clarify these issues.

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