Customer Adoption of Electronic Billing:
Incentive Payments vs. Green Fees

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ABSTRACT

Paperless or electronic billing leads to reduced operating costs for companies, offers convenience to the customers and is environmentally sustainable. However, despite various kinds of "Incentive Payments" offered by the companies, their customers have been surprisingly reluctant to adopt paperless billing. We provide analytical evidence to explain why incentive payments in vogue fail to achieve the desired outcome. We argue that the level of Incentive Payments currently offered by several companies is rather low, implying that they must provide higher payments in order to increase adoption rate. We also propose an alternative policy of charging a "Green Fee" on customers who prefer to receive paper statements. We demonstrate that the fee would unambiguously lead to higher enrollment of customers compared to a system with Incentive Payments. Furthermore, we find that if cost of sending paper bills is high, then Green Fee would be socially optimal. Businesses are better off under the proposed fee since it is cheaper to implement the program than providing incentive payments, and society benefits from the reduction in paper consumption.

Keywords: Electronic Billing, Paperless Statements, Customer Adoption, Incentive Payments, Green Fees

1. Introduction

Electronic or paperless billing is beneficial for all stakeholders, viz. companies, their customers and the environment. However it has not found widespread acceptance among the customers. For example, when Verizon entered all customers who had switched to paperless billing to a sweepstake offering, a Toyota Prius Hybrid, the resultant enrollment was only 17,000 per week. In contrast, when T-Mobile started charging its customers a fee of $1.50 for receiving paper bills, the resulting enrollment was 33,000 per day, or 231,000 per week (Stross, 2009). Thus a fee scheme seems to work better than incentives in terms of customers' willingness to switch to paperless programs.

As companies are facing budget reductions, the cost of managing paper based billing has become increasingly burdensome. Sending paper statements to the customers involves substantial variable cost which, however, is avoidable. With advances in information technology and digitized document management tools, companies are able to reduce their operating costs by going paperless. Several financial institutions, utility and phone companies are using a variety of strategies to reduce, if not eliminate sending paper statements to their customers. Electronic billing system is one of the emerging ways to reduce the operating costs of the companies. Unfortunately, customers' acceptance has remained a serious concern for the companies that have to spend millions of dollars annually in sending paper statements. Therefore, in spite of the fact that going paperless is more efficient than paper based billing, but the low rate of adoption among the customers is a paradox that deserves economic inquiry.

2. Background

Elimination of paper based billing can lead to pecuniary benefits for the companies. Contingent on customer acceptance of electronic bills, companies may realize significant cost savings from paper, print, postage, labor and equipment. Anecdotal evidence suggests that for every dollar spent on printing documents, companies spend another six dollars in handling and distribution (Hesseldahl, 2008). It is easy to see how much a typical company can save on an annual basis. For example, Verizon saves $600,000 annually for each 100,000 customers that go paperless (Deck, 2009).

For the consumers, the key benefit from going paperless emanates from convenience. Upon enrolling with the paperless program, they get notified electronically when their bills are ready. Customers can view, download and save all of the information they were previously receiving through paper statements, albeit with reduced clutter. A survey conducted by PayitGreen revealed that the customers who switched to online-only statements and bill payment were more satisfied with their financial institution (PayitGreen Survey, 2010). The study also showed that the enrolling customers benefit from convenience as well as various kinds of financial incentives offered by the

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companies. Thus paperless transactions lead to both tangible as well as intangible benefits for customers.

Paperless billing can also lead to environmental benefits. As promoted by the companies, e-billing conserves natural resources and is thus considered to be eco-friendly. By enrolling with paperless programs, the customers can potentially help reducing their carbon footprint. The U.S. Department of Agriculture asserts that if an additional 20 percent of all American households had switched to electronic bills it could have saved 1,811,275 trees per year (Javelin Research, 2007). If a million customers were to switch to paperless billing, it could save 400,000 pounds of paper, avoid 6 million pounds of greenhouse gases, and prevent 4 million gallons of wastewater from discharging into lakes, streams, and rivers in a year (www.paystolivegreen.com). Effectively, as more customers adopt paperless billing, it can lead to a greener environment. Therefore companies are using "Go paperless- Go Green" marketing strategies to attest their corporate social responsibility.

In spite of all the different kinds of benefits, the adoption of paperless statements has been modest among the customers. Since their customers have been reluctant to enroll with paperless programs, recently the companies are trying to promote the usage of electronic billing by providing incentive payments to them. Examples of this policy include Wells Fargo & Co. offering $5 to cardholders who opt to go paperless, Citibank, Citi Cards, Sprint offering $5 to the customers enrolling with paperless statements, JPMorgan Chase & Co. awarding $10 credits and sweepstakes prizes to customers who opt out of receiving paper documents. (Fitzgerald, 2009).

The economics of switching from paper to electronic/paperless documents is quite interesting. Although companies have tried different incentive strategies (viz. financial rewards, sweepstakes, etc.) to encourage adoption of paperless documents, their efforts have been successful only to a limited extent. In spite of the advertised benefits to the consumers and the environment, most of the customers still prefer to receive paper statements over electronic versions. According to Higdon et al. (2008), 84% of customers still receive paper statements, implying that adoption rates have been hovering around 15% only. On a similar note, Javelin Research report (2007) indicates that three out of four consumers still receive paper statements. Since the credit card industry sends out maximum number of paper statements, it is worthwhile to know how companies have fared in that industry. Citibank, for example, had pledged to plant a tree for every credit card user switching to paperless statement. The "Plant-a-Tree" initiative led roughly 300,000 consumers choosing paperless statements (Simon, 2007).

These ineffective attempts of the companies lead us to the following interesting research questions with important managerial implications. If electronic billing is indeed more efficient, what explains the reluctance among the customers to adopt it? The key objective of our paper is to design an efficient method for encouraging customers to go paperless. Evidently, the key challenge is how to draw in more customers to the environmentally benign paperless e-billing system. Are the companies offering realistic payments to their customers? What kind of strategy can lead to higher enrollment with paperless transactions? How do we judge the relative merits of the alternative strategies in terms of social efficiency? Before we proceed to answer these questions, a brief survey of the extant literature is warranted.

3. Literature review

With a few exceptions, formal studies related to adoption of electronic billing have been relatively scarce. Most of the existing works relate to electronic payment options. For instance, Humphrey et al. (2000) explain the main reasons why the shift from checks/cash payments to cheaper electronic payments has been sluggish. By comparing the modes of payment used by consumers, viz. cash, check, credit and debit cards they argue that institutional, regulatory, and historical features of the United States payments system has hindered the shift from checks to electronic payments. Humphrey et al. (2001) used Norwegian retail purchase data to demonstrate that customers' choice between paper and electronic payments depends on the relative prices of these two alternatives. Stefandis (2002) points out that in spite of the obvious efficiencies of electronic bill presentment and payment (EBPP) over traditional paper based alternatives; customers do not widely adopt the electronic billing system. His explanation for this lukewarm reception lies in the lack of coordination among billers and customers along with high fixed costs of the new technology. Bolt and Humphrey (2005) provide empirical evidence to argue that if users strongly value the improved convenience or security of electronic payments, pricing of paper based payments might not be necessary. Recently, Choudhary and Tyagi (2009) concluded that companies should provide economic incentives to their customers to adopt electronic payment schemes rather than credit cards.

Evidently, while electronic bill payment has been fairly common among the customers, electronic billing has not been favorably accepted so far. Although there is dearth of formal study on customer acceptance of electronic billing/paperless statements, we can garner useful insights from various surveys. For instance, a study by Javelin Research (2007) indicates that 75% consumers still receive paper statements. Jupiter Research findings (2006) indicate that 53% of online banking users would switch to electronic statements from paperless statements if they were made aware of the availability of electronic statements and were

notified when the statement was ready for viewing. Moreover, while only 17% of the consumers currently receive paperless statements, adoption rate could jump to 67% if consumers were offered some small-value gift and to 74% if a fee were charged in receiving paper statements. On a similar note, Fu (2007) attributes the reluctance among consumers to adopt electronic bill and statement presentment methods to a number of issues like familiarity and convenience of the paper method, security and privacy, and cost and lack of familiarity with electronic methods. A survey by Javelin Research (2007) indicates that the main barriers to customer adoption of paperless billing are concerns related to loss of control, record keeping and security.

From the above discussion we can see that although companies are trying to persuade their customers to switch to paperless billing, they have achieved only limited success at best. Admittedly, there are challenges that hinder transition from paper to electronic billing. While traditionally companies have been using "Incentive Payments" (henceforth, IP), one could also envisage other practical methods to encourage customers shift towards paperless billing. One such alternative method would be to impose a "Green Fee" (henceforth, GF) on those customers who want to receive paper statements. This nomenclature emanates from the idea that the fee is imposed in order to reduce paper consumption among the customers, thereby leading to a greener environment. In the following section we analyze the relative merits of IP vs. GF in terms of their effects on a company, its customers and the society as a whole.

4. Analytical Model

We consider a simple model of interaction between a company and its customers. The success or failure of any policy would be contingent on the customers' reaction to the plans envisaged by the company. Our objective is to compare the relative efficiencies of the strategy being currently used (viz. IP) and the proposed policy (viz. GF). To that end, we evaluate the effectiveness of the two alternative policies in terms of their ability to increase customer enrollment and their effect on aggregate social welfare.

4.1 Incentive payment scheme (IP)

First we develop and analyze the state of the practice IP scheme. For instance, Citibank and Sprint offered $5 to each of the customers enrolling with paperless statements. Our objective is to design an incentive compatible dollar amount that would be acceptable to the customers. To help fix ideas, we consider a representative company making a take-it-or-leave-it offer to its customers for switching to electronic billing/statements. Specifically, it announces to reward an incentive payment to all of its customers who agree to shift to electronic billing.

Essentially, the company and its customers play a sequential game. The company posts a financial incentive offer as follows: customers who make a switch from paper statements to electronic billing would be awarded $L each. After they have observed the level of IP, the customers decide whether to accept or reject the offer. Depending on the strategies chosen by the customers, the company pays the announced reward to the enrolling customers and the non-enrolling customers continue receiving paper documents.

We assume that the net benefit of paper statements to a customer is u. This parameter might be interpreted as familiarity, record keeping ability, etc., offered by paper version. However, by enrolling with the paperless program, the customers can access the same information electronically as they could have obtained from paper documents. Also, companies promote use of paperless statements on the ground of efficiency and security provided by electronic documents. Let v denote the perceived benefit of a customer receiving electronic documents. Customers are heterogeneous with respect to their perceived benefit from paperless documents: v is assumed to be uniformly distributed over [0, 1] and we normalize the total population to 1. Information is asymmetric between the players. The company does not know how much benefit a customer would get from going paperless. The company knows that the perceived benefit of customers is randomly distributed over unit interval. Depending on their perceived benefits, one group of customers would enroll with the paperless program and the other group would continue receiving paper documents from the company. The marginal customer who enrolls with the program gets a benefit of v*. Thus the customers with perceived benefit   would enroll with the paperless program, while customers with would continue receiving paper statements.

A customer with perceived benefit v would switch if the net benefit from going paperless exceeds u, the net benefit that s/he derives from paper statement. Therefore in order to induce a customer to adopt electronic bill, the company ought to set the level of incentive payment L such that it would satisfy her Incentive Compatibility Constraint (ICC). Formally, L must comply with the following constraint:

$$v + L \quad u.^{3} \tag{1}$$

The ICC ensures that net benefit from accepting the offer (and receiving electronic statements) must exceed the net benefit from rejecting the offer (and staying with paper version). From (1) we can see that the threshold required for customers to switch to paperless program is .

$$v* = u - L \tag{2}$$

For simplicity we aggregate all of the variable costs of the company as $c for sending paper bills per customer. It could be interpreted as processing cost of the company in

a paper-based system. We also assume that the company has already invested in the paperless technology and the marginal cost of sending electronic statements to the customers is negligible. Since the investment cost is already sunk, our aim is to suggest an optimal policy for a company to increase customer enrollment with the paperless program. The expected benefit of the company under IP scheme is

$$\Pi^{IP}_{company} = \int_{v^*}^{1} (c - L) f(v) dv - \int_{0}^{v^*} c f(v) dv \qquad (3)$$

The first part in the expression above is the net benefit of the company from the group of customers who enroll with the paperless program. For each of the enrolling customer, the company saves the variable cost c less the incentive payment L. The second component is the cost of (printing and mailing) paper documents for the customers who do not enroll with the program. The equilibrium level of IP is

$$L^* = c - \frac{1 - u}{2} \qquad (4)$$

the threshold required for customers to switch to paperless program is

$$v^* = \frac{1 + u}{2} - c \qquad (5)$$

with the resulting enrollment

$$N^{IP} = 1 - v^* = c + \frac{1 - u}{2} \qquad (6)$$

and benefit of the company would be

$$\Pi^{IP}_{company} = c^2 - c \, u + \frac{(1 - u)^2}{4} \qquad (7)$$

Lemma 1

The restriction $\frac{u + 1}{2} \geq c \geq \frac{u - 1}{2}$ ensures $\qquad (8)$

Lemma 2

In equilibrium it must be true that the net savings of the company per enrolling customer is non negative. Therefore $c - L^* \geq 0$ implies that

$$1 \geq u \qquad (9)$$

Thus the company would give a financial incentive L* to each of the customers who enroll with paperless program. Following the reward announcement, NIP customers would enroll with the program and consequently the total benefit of the company under the IP scheme would be $\Pi^{IP}_{company}$. The optimized levels of the endogenous variables (viz. incentive payment, customer enrollment and company benefits) are obtained in terms of the exogenous parameters (viz. cost of paper documents and benefit of the customers from receiving paper statements).

Equation 4 deserves a closer look. The optimum incentive payment set by the company has two components. The IP must include the cost of sending paper documents to a customer, less an amount related to the benefit from

receiving paper documents. Therefore in order to induce a customer to switch to paperless program, she must be given a reasonable share of the cost saved by the company through the program. Since most of the companies have not met the desired level of enrollment so far, the poor performance of the reward programs might be attributed to the level of incentive payment actually used. As we have seen, several companies have offered $5 to $10 as the reward for each customer who enrolls with paperless program. Assuming the average cost of printing and mailing a paper document as roughly $2, the annual cost savings of the company per customer is at least $24. Thus the level of incentive rewards in vogue is much less than the annualized savings gained by the company. Hence, one could argue that the payments being currently used are not incentive compatible for the customers. Since companies can potentially save millions of dollars from their customers switching to electronic statements, the customers should also get a fair share of the savings. The implication of this finding is that the companies must increase the incentive rewards from their current level if they want better adoption rate among their customers.

Proposition 1

As sending paper bills becomes more costly, the company would increase the equilibrium level of incentive payment. It would also lead to a reduced threshold required for customers to switch, a higher enrollment and lower net benefits for the company:

$$\frac{L^*}{c} > 0 \quad \frac{v^*}{c} < 0 \quad \frac{N^{IP}}{c} > 0 \quad \text{and} \quad \frac{\Pi^{IP}_{company}}{c} < 0 \qquad (10)$$

Economic intuition behind these results is as follows. As the cost of creating and dispatching paper documents increase (say due to increase in postage), the company would like to take a more aggressive approach to reduce its operational costs. In order to encourage more customers to switch to paperless program, the company would have to increase the level of IP. Since the equilibrium level of incentive payment increases, equation 2 suggests that the threshold v* would decline and consequently a larger number of customers would enroll with the paperless program. Finally, since higher cost would lead to higher IP and hence higher enrollment, the company would have to spend more money in the IP scheme. Also, because of higher enrollment, the company would have to spend less on sending paper bills. The net effect on the company would be negative under Lemma 3.

Proposition 2

If the value of paper bills is high among the customers, the company would have to increase the equilibrium level of incentive payments. The threshold required for customers to switch would increase and total enrollment would decrease. The net effect on the company would be negative:

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[1]   It is easy to see that our approach is not limited to electronic billing/statements. Analysis would be similar for companies willing to shift customers from any form of paper documents (like legal correspondences, letters, etc.) to their electronic versions.

$$\frac{L*}{u} > 0 \quad \frac{v*}{u} > 0 \quad \frac{N^{IP}}{u} < 0 \text{ and } \frac{{}^{IP}_{company}}{u} < 0 \quad (11)$$

Economic intuition behind these results is as follows. The parameter u represents customer's benefit from receiving paper statements. If the customers obtain high perceived benefit from paper bills, the company would have to push up the equilibrium level of incentive rewards. If the attractiveness of paper documents becomes high, the threshold benefit required for customers to switch to paperless program would have to be high as well. As v* rises, the proportion of customers who would enroll with the program would decrease, since by definition . Thus, an increase in perceived benefit from paper documents would lead to higher IP and lesser enrollment. The net effect on the expected benefit of the company could go either way. However, under the conditions imposed by Lemma1, the net effect would be negative. It means that company's expected benefit would fall as customers put high value on paper statements.

4.2 Green fee scheme(GF)

Given the unsatisfactory performance of the state of the practice IP scheme, we suggest an alternative policy that is intended to increase enrollment among the customers. In particular, we propose a Green Fee of $F to be imposed on the customers who want to continue receiving paper statements. For instance, the Hong Kong arm of HSBC Holdings recently announced that from January 2011 it will charge its credit card customers $2.60 annually to continue receiving paper statements (Fitzgerlad, 2009). Under the GF policy, the incentive compatibility constraint of a customer would be

$$v \quad u - F. \quad ^4 \quad (12)$$

It ensures that the benefit from enrolling with paperless program must be at least equal to the net benefit from not enrolling and pay a fee F to receive paper documents. Evidently, an enrolling customer obtains benefit from going paperless, where

$$v** = u - F \quad (13)$$

Therefore the benefit of the company under the GF policy would be

$$^{GF}_{company} = \int_{v**}^{1} cf(v)dv + \int_{0}^{v**} (F - c)f(v)dv \quad (14)$$

The first part is the savings of the company from the customers who enroll with the paperless program. The second part of the expression is the net benefit from the customers lying in the interval [0, v**) and do not make a switch. The company would charge a fee F and mail out paper documents by incurring a cost c per non enrolling customer. Under the proposed policy, the company would choose the optimal fee as

$$F* = c + \frac{u}{2} \quad (15)$$

The threshold required for customers to switch is

$$v** = \frac{u}{2} - c \quad (16)$$

with the resulting enrollment

$$N^{GF} = 1 - v** = c + 1 - \frac{u}{2} \quad (17)$$

and the company obtains net benefit

$$^{GF}_{company} = c^2 - c \quad u + c + \frac{u^2}{4} \quad (18)$$

Lemma3

The parametric restriction $\frac{u}{2} \quad c \quad \frac{u}{2} - 1$ ensures that $v**$ [0,1]

$$(19)$$

Lemma4

Lemmas 1 and 3 can be combined as .

$$_1 \quad \frac{u}{2} \quad c \quad \frac{u-1}{2} \quad _2 \quad (20)$$

We note from equation 15 that the proposed Green Fee must be equal to the company's cost of dispatching a paper document plus an expression depending on the customer's benefit from receiving paper documents. Thus the company effectively makes the customer pay for what she is willing to receive, viz. paper documents instead of enrolling with the paperless program. In this sense the proposed fee scheme works on the principle of direct user cost. In contrast, recall that the IP mechanism of using rewards work in an indirect way by giving customers a share of the cost savings enjoyed by the company. As we have demonstrated earlier, in practice the company does not want to give a fair portion of the savings accumulated to the customers. Consequently the level of IP rewarded by the company is not incentive compatible, which eventually leads to lower rate of adoption among the customers. This is the key difference among the two policies in terms of operational mechanism.

Proposition3

As the cost of sending paper bills increase, the company would impose a higher fee. This would lead to a lower threshold for customers to switch and consequently higher enrollment. The net effect on the company would be favorable:

$$\frac{F*}{c} > 0 \quad \frac{v**}{c} < 0 \quad \frac{N^{GF}}{c} > 0 \quad \text{and} \quad \frac{^{GF}_{company}}{c} > 0 \quad (21)$$

Economic logic of this proposition is as follows. With an increase in costs, the company would charge a higher fee for sending paper bills to its customers. Consequently, a reduced threshold is required to induce customers switch to electronic bills. Due to a reduced threshold, more customers would enroll with the program. Finally, the effect on net benefit of the company could go either way. Going back to equation 14, an increase in cost of

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[2] Typical benefits from enrolling with paperless documents include the following: Instant bill delivery to registered email address, quicker payments, safety, immediate access to account information, etc. All of these lead to convenience which, however, is intangible.

dispatching paper documents would reduce the threshold v^{**} required for enrollment. Consequently the company would save dispatch cost for the customers located in $[v^{**}, 1]$ who would enroll. On the other hand, while the total fees received from non-enrolling group of customers located in $[0, v^{**})$ would fall, the total cost of dispatching documents to these customers would drop as well. The net effect would be favorable for the company under the restrictions imposed by Lemma 1.

Proposition 4

If the customers obtain high benefit from paper statements, the company would have to charge a higher fee. The threshold required for customers to switch would increase and consequently total enrollment would fall. The net effect on the company would be favorable:

$$\frac{F^*}{u} > 0 \quad \frac{v^{**}}{u} > 0 \quad \frac{N^{GF}}{u} < 0 \text{ and } \frac{{}^{GF}_{company}}{u} > 0 \tag{22}$$

Economic interpretation: The parameter u captures customer's perceived benefit from receiving paper documents. The company would have to push up the fees such that the attractiveness of receiving paper documents decrease among the customers. If customers put more value on paper documents, the threshold required for them to switch will increase as well, as evident from equation 13, Consequently less number of customers would enroll with paperless program as the attractiveness of receiving paper documents increase. Finally, the effect on expected net benefits of the company can be examined using equation 14, Since there is reduced enrollment with the program, the company would collect a large amount of fees from the non-enrolling customers located in $[0, v^{**})$. The downside is reduced cost savings from enrolling customers located in $[v^{**}, 1]$ and higher dispatch cost to the non-enrolling customers located in $[0, v^{**})$. The net effect could go either way. But under the parametric restrictions imposed by Lemma 3, the effect on the company would be positive. The key to this result is the increased Green Fees collected from the non-switching customers.

Proposition 5

The proposed Green Fee would unambiguously lead to higher enrollment of customers compared to the state of the practice Incentive Payments:

$$N^{GF} > N^{IP} \tag{23}$$

This result can be traced back to the ICC(s) of the customers specified in equation (1) for IP and (8) for GF policies respectively. Since the equilibrium level of fees imposed, F^*, is larger than the incentive payment, L^*, a smaller threshold is required for customers to switch to paperless program under GF policy. This leads to increased customer enrollment compared to the IP

scheme. In other words, by imposing a user fee on the customers, the company can reduce the attractiveness of receiving paper documents more effectively than by offering incentive rewards. Our result in fact concurs with a recent experience of T-Mobile. Immediately after the company imposed a $1.50 for every printed bill, about 231,000 customers made a switch per week to paperless mode. In contrast, when Verizon entered all of the enrolling customers in a sweepstake, the enrollment was only 6100 per week (Stross, 2009). Thus we can say that GF is going to be more effective than an IP scheme as far as enrollment is concerned.

Proposition 6

It would be optimal for a company to impose Green Fee on the customers when the cost of sending paper documents exceeds a threshold. However, if cost is lower than the threshold, optimal policy would be to offer Incentive Payments:

$${}^{GF}_{company} \quad {}^{IP}_{company} \text{ when } c \quad \frac{1-2u}{4} \quad {}_{3} \text{ and}$$

$${}^{GF}_{company} \quad {}^{IP}_{company} \text{ otherwise.}$$

$$\tag{24}$$

The economic interpretation of this proposition is as follows. If costs of sending paper statements were greater than threshold , the company would have to give a high level of incentive payment L^* under the IP scheme. Therefore the total payments to the enrolling customers would be high, which would lead to reduced benefits for the company. In contrast, if costs were high, under the GF policy the company would impose a higher level of fee F^* and consequently collect large amount of fees from the non enrolling customers. Thus expected benefit of the company would be higher under GF policy when costs exceed . On the other hand, if costs were below the threshold , the company would have to give a low level of incentive payment under IP scheme. Therefore total payments to the group of enrolling customers would also be low, leading to higher benefit for the company. In contrast, under the GF the company would impose a lower level of fee. Consequently, the total fees collected from the group of non-enrolling customers would be less, thereby leading to a dampened effect on the company's net benefits vis-à-vis the IP scheme. Hence we find that the expected benefit of the company would be higher under IP when cost is below .

From Proposition 6 we see that as far as the company is concerned, the optimal policy would be GF if costs were high and IP otherwise. A related question would be: what can we say regarding the optimal scheme for the customers and the society as a whole? Evidently, total

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[3]   The Participation Constraint $v + L > 0$ is less binding than the ICC and is satisfied in equilibrium.

expected benefit of all (both enrolling and non-enrolling) the customers under the SOP scheme would be

$$U_{customers}^{IP} = \int_{v^*}^{1} (v + L^*)f(v)dv + \int_{0}^{v^*} uf(v)dv \qquad (25)$$

The first part is the total benefit of the customers who enroll with paperless program. Each of the enrolling customers gets benefit v from documents received electronically and the incentive payment L* from the company. The remaining fraction of customers located in the interval [0, v*) do not enroll with the program and continue getting benefit u from paper documents. Substituting the optimized values of v* and L* from equation 4 and 5, we obtain the reduced form of the above expression as

$$U_{customers}^{IP} = \frac{u^2 - 4uc + 4c^2 + 1 + 4c + 6u}{8} \qquad (26)$$

On the other hand, the aggregate benefit of the customers under the PFS is

$$U_{customers}^{GF} = \int_{v^{**}}^{1} vf(v)dv + \int_{0}^{v^{**}} (u - F^*)f(v)dv \qquad (27)$$

The customers lying in the interval [v**, 1] enroll with the paperless program and obtain benefit v from documents received electronically. The group of customers located in

[0, v**) do not enroll with the program and consequently pay the fee F* to receive the paper documents. Plugging in the optimal value of v** and F* from equation 15 to 18, we obtain the total benefit of all the customers under GF policy as

$$U_{customers}^{GF} = \frac{4 + u^2 - 4uc + 4c^2}{8} \qquad (28)$$

Proposition 7

If costs of sending paper statements were lower than a threshold, the aggregate benefit of all the customers would be higher under the GF compared to the IP scheme. If costs exceed the threshold, the ranking would be opposite:

$$U_{customers}^{GF} \geq U_{customers}^{IP} \quad \text{if} \quad c \leq \frac{3 - 6u}{4}$$
$$U_{customers}^{GF} < U_{customers}^{IP} \quad \text{otherwise.} \qquad (29)$$

If costs were low, under the GF policy the company would charge a low fee to the non enrolling customers. This along with the fact that more customers would enroll with paperless program under GF (vide Proposition 5); the total benefit of all the customers would be higher compared to the IP case. On the other hand, if costs exceed the threshold, under the IP scheme the company would be giving higher level of incentive payments to induce more customers towards paperless program. With the resulting

increased enrollment, the aggregate benefit of the customers would be large. In contrast, under the GF, the company would charge a high fee and therefore the aggregate benefit of the customers would be less compared to the IP case.

From propositions 6 and 7 we see that if costs were high, the optimal policy for the company would be GF over IP. On the other hand, aggregate benefit of the customers would be higher under GF if costs were low. This leads to a classic economic problem involving trade-offs. The merit of the two alternative schemes is finally assessed by comparing the net social welfare (SW) under the alternative policies. To that end, we obtain aggregate benefit of the company and the customers under each policy. For the purpose of this paper, we define social welfare as the aggregate benefit of the company and its customers:

$$SW^{IP} = \prod_{company}^{IP} + U_{customers}^{IP}$$

Under the State of Practice scheme the reduced form expression using equation 7 and 26 is:

$$SW^{IP} = \frac{3u^2 - 12uc + 12c^2 + 3 + 4c + 2u}{8} \qquad (30)$$

and under the Proposed fee Scheme, using (10iv) and (20) we obtain

$$SW^{GF} = \prod_{company}^{GF} + U_{customers}^{GF} = \frac{8c - 12uc + 12c^2 + 3u^2 + 4}{8} \qquad (31)$$

Proposition 8

The Green Fee would lead to higher Social Welfare if cost of sending paper statements exceed a threshold level. However, if costs were below the threshold, Social Welfare would be higher under the Incentive Payments scheme:

$$SW^{GF} \geq SW^{IP} \quad \text{if} \quad c \geq \frac{2u - 1}{4}$$ [5]
$$SW^{GF} < SW^{IP} \quad \text{otherwise.} \qquad (32)$$

The economic interpretation of this result is as follows. If costs of sending paper documents were high, the company would charge a high fee, F*. This would lead to lower threshold v* required for customers to switch to paperless program and consequently higher enrollment, NGF. Thus the company would be able to save more cost due to higher enrollment. Also, since F* is high, the company would also be able to collect high fees from the non enrolling group of customers. These two factors would impact the company favorably. As far as the customers are concerned, due to higher enrollment, a large number of customers would enjoy the benefits offered by electronic billing system. All these effects would lead to high social welfare when costs are high.

In contrast, under IP scheme, the company would have to give high level of incentive rewards if costs exceed the

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[4] Similar to the IP case, the participation constraint v > 0 would be satisfied in equilibrium.

threshold. Thus the company would have to pay more money in terms of incentive payments. As far as the customers are concerned, although a high incentive payment, L* would lead to higher enrolment NIP, we recall from Proposition5 that the fee scheme would lead to higher enrollment. Thus the aggregate benefit enjoyed by enrolling customers would be lesser in IP scheme compared to the GF policy. Consequently, social welfare would be lower under IP scheme when cost is high.

On the other hand, if costs were lower than the threshold, the company would impose a lower fee, F* which would lead to higher threshold, v* and consequently lower enrollment, NGF. Since less number of customers would enroll with the program, the savings of the company would be low. In addition, due to a low fee F*, the company would collect less fees from the enrolling customers. All of these factors would lead to low SW under GF policy. In contrast, if costs were below the threshold, the company would choose a low level of incentive payment, L*, which would lead to higher threshold, v* and consequently lower enrolment, NIP. Therefore the company would have to pay less money in terms of incentive payments. This would affect the company favorably. Thus SW would be higher under IP scheme if costs were lower than the threshold level.

From the above reasoning we infer that if the cost of sending paper statements is high, then from a societal point of view, charging a Green Fee would be optimal. However, if costs were low, then the optimal policy would be Incentive Payments currently in vogue.

5. Discussion and Managerial Implications

As pointed out in the introduction of this paper, organizations have not been very successful in switching their customers from receiving paper statements. In the light of this paper, what can companies do in order to increase enrollment among customers? A closer look at the Incentive Compatibility Constraint(s) of the customers indicate that the companies need to deploy strategies that would reduce the threshold benefit required for customers to switch from paper to electronic mode. This goal can be achieved either by a) increasing Incentive Payment L* or Green Fee F*, and/or b) reducing the attractiveness of receiving paper documents (i.e. by reducing u). We discuss each of these strategies below.

The reluctance among customers in adopting paperless statements could be attributed to the level of incentive payment currently offered by the companies. Customers may look upon the prevailing incentive offers as inadequate to make the switch. In other words, rewards as low as $5 - $10 is likely to be incentive incompatible from the customer's perspective. If the management decides to continue with incentive payments, they must revisit the adequacy and efficiency of the incentive rewards. An increase in the level of incentive payment could lead to increased adoption rate among the customers.

A practical way to reduce u (i.e. the perceived value of paper statements to the customers) would be to increase the relative attractiveness of paperless transactions. To that end, the companies ought to clearly communicate the value of electronic billing to their customers. Often, customers are averse to electronic transactions due to problems like Identity Theft, Phishing issues, etc. If the companies can ensure increased security and convenience by using advanced encryption technology, then the perceived benefits of paperless transactions would increase significantly. As a part of their marketing strategy, the companies could also provide access to historical archive of records, instant notification to customers when documents are ready, etc., which would help them stay organized. In other words, with reduced attractiveness of receiving paper documents more customers would enroll with paperless programs.

This research has important practical implications also for organizations in paper-intensive industries like healthcare, insurance, etc. As companies are trying to digitize and automate their document management process, they ought to keep in consideration the expected reaction of their customers to alternative policies. Admittedly, one might be concerned about the plausibility of the proposed Green Fee. In fact, the recent American Recovery and Reinvestment Act of 2009 (ARRA) introduced incentives to physicians for adopting Electronic Health Record (EHR) solutions. Each physician adopting EHR by 2011 could receive up to $44,000 in incentive payments. Interestingly, and much along the lines of this paper, those physicians who do not adopt EHR by 2014 would face penalties (Nussbaum, 2009). This attests the main suggestion of our paper that user fee is likely to be more effective in reducing paper consumption.

6. Factors Affecting Customer Response

Evidently, customers' propensity to adopt electronic documents is contingent on age, experience, level of income among other factors. Customers who have limited access to information technologies would be more averse to paperless programs. Ceteris paribus, young consumers are more likely to adopt paperless methods because of their familiarity and access to internet. Customers often exhibit inertia to change their current practice and this can lead to reduced adoption rates as well. Their reluctance to adopt paperless transactions is attributable to lack of experience with the new technology. Companies must take into consideration the fact that some customers lack access to the internet. A special exemption for households without internet access is not impossible.

An important factor that might be hindering adoption is the mode of promotion the companies have been using.

Customers who have access to internet get these promotional offers more often and the benefits are perhaps more effectively communicated to them. But for customers with lack of internet access, it is relatively harder to convey the benefits of paperless programs. It is plausible that adoption rate would increase over time as internet access becomes more pervasive.

Income elasticity could be another important factor behind customer adoption of paperless alternative. Ceteris paribus, customers with low income are more likely to switch than those with higher income. Indeed, US households headed by consumers 45 to 64 years old and with household income exceeding $65,000 per year receive the most number of bills and statements (Fu, 2007). A recent survey also reveals that adoption rates tend to vary among age groups. Consumers aged 55-64 are least likely to go paperless (Pay It Green Survey, 2010). Therefore this section of the population constitutes a significant target group for the companies willing to go paperless.

7. Limitations and Future Directions

We have taken a theoretical approach to explain the phenomenon of customer reluctance to adopt electronic statements. While this is the first step to understand the problem, the relative merit of alternative policies requires an empirical assessment too. Further work is required to gauge the level of incentive payments/fees that are required to induce customers to adopt e-billing. It would also help to examine how the responsiveness to incentive payments/ fees varies due to customer demographics.

8. Conclusion

Several companies are trying to take environmentally sustainable steps by experimenting with different "green" practices that are intended to be eco-friendly and can help reduce a social waste. Since going paperless is socially efficient, companies are trying to reduce usage of paper consumption through various strategies. The success of these strategies, however, critically depends on their customers' reaction. Companies frequently have offered financial incentives to their customers to encourage use of paperless/electronic billing. Unfortunately, incentives have not led to high rate of adoption among the customers. We argue that adoption might have been low because the incentive payments being currently offered are incentive incompatible for the customers. Also, there is incomplete information regarding customers' perceived benefit from convenience emanating from electronic billing. We demonstrate that an alternative mechanism, viz. charging a Green Fee on customers willing to continue with paper statements is more effective way to increase enrollment. We also find that if cost of sending paper documents is high, then the fee would lead to higher social welfare as well. We believe this paper provides valuable insights for the companies who are seeking to reduce their paper usage and be environmentally conscientious.

Appendix
Proof of Proposition 1

$$\frac{L^*}{c} = 1, \frac{v^*}{c} = -1, \frac{N^{IP}}{c} = 1 \text{ and } \frac{\pi^{IP}_{company}}{c} = 2c - u \geq 0, \text{ by Lemma 3.} \qquad (33)$$

Proof of Proposition 2

$$\frac{L^*}{u} = \frac{1}{2}, \frac{N^{IP}}{u} = \frac{1}{2} \text{ and } \frac{\pi^{IP}_{company}}{u} = -c - \frac{u-1}{2} \geq 0 \text{ by Lemma 1.} \qquad (34)$$

Proof of Proposition 3

$$\frac{F^*}{c} = 1, \frac{v^{**}}{c} = -1, \frac{N^{GF}}{c} = 1 \text{ and } \frac{\pi^{GF}_{company}}{c} = 2c - u + 1 \geq 0 \text{ by Lemma 1.} \qquad (35)$$

Proof of Proposition 4

$$\frac{F^*}{u} = \frac{1}{2}, \frac{v^{**}}{u} = \frac{1}{2}, \frac{N^{GF}}{u} = -\frac{1}{2} \text{ and } \frac{\pi^{GF}_{company}}{u} = \frac{u}{2} - c \geq 0 \text{ using Lemma 3.} \qquad (36)$$

Proof of Proposition 5

$$N^{GF} - N^{IP} = \frac{1}{2} \qquad (37)$$

Proof of Proposition 6

$$\pi^{GF}_{company} - \pi^{IP}_{company} = c + \frac{u}{2} - \frac{1}{4} \geq 0 \text{ when } c \geq \frac{1-2u}{4} \equiv \lambda_3.$$

Now by Lemma 4, $\lambda_1 \equiv \frac{u}{2} \geq c \geq \frac{u-1}{2} \equiv \lambda_2.$

Also by Lemma 2, $u \leq 1.$

Since cost is non-negative, Lemma 4 and Lemma 2 can be combined as

$\lambda_1 \geq c \geq 0 \geq \lambda_2.$

We find that $\lambda_1 \geq \lambda_3 \geq 0 \geq \lambda_2$ when $u \in [0.25, 0.50] \qquad (38)$

Proof of Proposition 7

$$U^{GF}_{customers} - U^{IP}_{customers} = \frac{3 - 4c - 6u}{8} \geq 0 \text{ when } c \leq \frac{3-6u}{4} \equiv \lambda_4.$$

It is true that $\lambda_1 \geq \lambda_4 \geq 0 \geq \lambda_2$ when $u \in [0.375, 0.50] \qquad (39)$

Proof of Proposition 8

$$SW^{GF} - SW^{IP} = \frac{4c - 2u + 1}{8} \geq 0 \text{ if } c \geq \frac{2u-1}{4} \equiv \lambda_5.$$

We find that $\lambda_1 \geq 0 \geq \lambda_5 \geq \lambda_2$ when $u \leq 0.5 \qquad (40)$

It is easy to deduce from equation 38 through equation 40 that the final ranking of the thresholds is

$\lambda_1 \geq \lambda_4 \geq \lambda_3 \geq 0 \geq \lambda_5 \geq \lambda_2$ When $u \in [0.375, 0.50]$

References

- Bolt, W., Humphrey D. and Uittenbogaard, R., The Effect of Transaction Pricing on the Adoption of Electronic Payments: A Cross-Country Comparison, Federal Reserve Bank of Philadephia Working Paper No. 05-28.

- Choudhary,V. and Tyagi, R.K., Economic incentives to adopt electronic payment schemes under competition, Decision Support Systems ,46, 2009, 552-561.

- Deck, D., T-Mobile abandons plan on billing policy,

Queens Chronicle, 2009.

- Fitzgerald,K., Issuers Mulling Paperless Statements as Cost Measure, American Banker, Pg. 12 ,Vol. 174, No. 176.

- Fu, A., Bills, Statements and Payments - Paper and Electronic Delivery, Paper No. 2007-4, www.postinsight.com, August 2007.

- Hesseldahl, A., The New Push to Get Rid of Paper, http://www.businessweek.com, May, 2008. Accessed August, 2010.

- Higdon, E., Ensor, B., and Wannemacher, P., Pulling the Plug On Paper Statements, Forrester Research, 2008.

- Humphrey,D.B., Pulley,L.B., and Vesala, J.M.,   The Check's in the Mail: Why the United States Lags in the Adoption of Cost-Saving Electronic Payments, Journal of Financial Services Research 17:1, 17-39, 2000.

- Humphrey,D.B., Kim., M., and Vale, B., Realizing the gains from electronic payments: costs, pricing and payment choice, Journal of Money, Credit, and Banking, 33(2), 2001.

- Javelin Research, Online Banking and Bill Payment: Trends, Forecasts and Strategies for Reinvigorating Growth and Adoption, 2007. www.javelinstrategy.com/research, Accessed May 1, 2010.

- Jupiter Research, Study Examines Motivators In Moving To Paperless Statements, The Credit Union Journal, February 2006.

- Nussbaum, G.M., Practical Aspects of the Incentive Payments to Physicians for Electronic Health Record Adoption, Reprint from American Health Lawyers Association Physician Organizations, July, 2009.

- PayItGreen Survey, NACHA, www.nacha.org, Accessed June, 2010.

- www.paystolivegreen.com/2009/03/quick-savings-tip-go-paperless. Accessed August, 2010.

- Simon, J., Paperless Citi statements mean more trees, http://www.creditcards.com, 2007.

- Stefanadis,C., Why Hasn't Electronic Bill Presentment and Payment Taken Off?, Current Issues in Economics and Finance, Federal Reserve Bank of New York, Volume 8 Number 7, 2002.

- Stross, R., What if People Don't Take the Bait to Go Paperless?, The New York Times, September 20,