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An Analysis of the Determinants of Tipping Behavior: A Laboratory Experiment and Evidence from Restaurant Tipping

Matt Parrett*

This paper explores several determinants of tipping behavior. First, I consider two social norms explanations—reciprocity and letdown (guilt) aversion—of why consumers tip in restaurants. Second, I examine three aspects of the tipping situation that influence how much consumers tip in restaurants: table size, sex, and method of bill payment. I address these issues using two data sources: a field survey and laboratory experiments. Customers were surveyed individually as they left a set of restaurants in Richmond, Virginia. The laboratory experiments vary service quality, table size, and information about others' tips in a controlled setting. Results from both data sets show support for reciprocity and letdown aversion, and that tip size decreases with table size. Sex differences, which exist only in the experimental data, show that men tip more than women. Finally, the size of the tip does not depend on the method of bill payment.

JEL Classification: C90, Z13, D00

1. Introduction

Restaurant tipping is a significant part of the economy. In 2003, sales at full-service restaurants totaled approximately $151 billion (U.S. Census Bureau 2005). Assuming a tipping norm of 15%, waiters and waitresses in the country earned roughly $22.7 billion in tip income in 2003. Restaurant tipping is also puzzling, at least from the point of view of standard neoclassical economic theory. Why do consumers voluntarily give money to their server *after* the service has been rendered? Interestingly, consumers still leave their server a tip even when they plan never to visit the restaurant again (Kahneman, Knetsch, and Thaler 1986).

In this paper, I explore several determinants of tipping behavior using survey and laboratory experimental data. First, I examine social norms related to reciprocity and letdown (guilt) aversion. Reciprocity refers to the idea that people reward kind actions and punish unkind actions, and implies a positive relationship between the size of the tip and service quality. According to Fehr and Gachter (2000), there is considerable evidence that suggests a strong role for reciprocity in motivating human behavior.[1] The theory of letdown (guilt)

* Deloitte Tax LLP, 136 Peachtree Memorial Dr. GA6, Atlanta, GA 30309, USA; E-mail mparrett@vt.edu; corresponding author.

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[1] Reciprocity closely resembles gift exchange, which is defined as an informally enforced agreement to give goods, services, information, or money in exchange for future compensation in-kind (see Akerlof 1982). However, according to Kranton (1996), gift exchange takes place between people who know each other well, so that each person has an incentive to be reliable and honest. I believe reciprocity is more general, in that it does not require this.

aversion asserts that decision-makers avoid letting others down. Charness and Dufwenberg (2002) show that letdown aversion implies that a consumer's tip depends positively on what the consumer believes the server thinks the consumer will tip.

Although the relationship between service quality and tip size has been studied by several authors (Lynn and McCall 2000a provide a survey and meta-analysis), it is typically explained using either a buyer monitoring story (Bodvarsson and Gibson 1992; Lynn and Graves 1996) or equity theory (Lynn and Grassman 1990; Lynn and Graves 1996).[2] Both Conlin, Lynn, and O'Donoghue (2003) and Azar (2004) mention norms in their recent work on tipping. However, the work by Conlin et al. makes assumptions regarding, rather than trying to determine as I do here, norms that operate in a tipping environment. Azar, on the other hand, is interested in how norms evolve, a topic that I do not address in this paper.

I also examine three aspects of the tipping situation that influence how much consumers tip in restaurants: table size, the sex of the customer, and method of bill payment (cash or credit card). Looking first at table size, at least two factors are at issue, and they work in opposite directions. First, tippers may tip a higher amount in the presence of others at the table in order to assert social status. Status considerations play a nontrivial role in real-world interactions (Ball et al. 2001), and thus might induce consumers to tip more as a form of status acquisition or display. Alternatively, tippers may "free ride" on the tips of others at the table, and thus tip less. However, the common restaurant practice of adding an automatic service charge onto bills at large table sizes (usually six or more customers) suggests that incentives to free ride may dominate. Previous research on this topic is mixed, with some studies finding a positive relationship between tip size and table size (e.g., Lynn and Grassman 1990; Boyes, Mounts, and Sowell 1998; Conlin, Lynn, and O'Donoghue 2003), some finding a negative relationship (e.g., Lynn and Latane 1984; Bodvarsson and Gibson 1997), and others finding no relationship (e.g., Lynn and Latane 1984; Lynn and Grassman 1990; Lynn and Graves 1996; Rind and Strohmetz 1999, 2001a, b).

There is considerable evidence that men and women differ in the economic decisions that they make (Eckel and Grossman 2005). Women tend to be more generous than men in experimental settings such as the Dictator Game, where one player has the opportunity to share an endowment with another person or organization. This paper addresses whether this result carries over into the decision to tip. Because men on average earn about 35% more than women (Council of Economic Advisors 2002), higher income levels could result in higher tips in restaurants by men. However, in both the laboratory experiments and with the survey data, income effects can be separated from sex-related propensities to give. Previous research on sex differences in tipping suggests that men tip more than women (e.g., Lynn and McCall 2000b).

Finally, I look at whether consumers who pay their bill with cash tip differently from those who pay by credit card. This finding has relevance for a recent Supreme Court case. At present, the National Restaurant Association is trying to get the Supreme Court's ruling in *United States v. Fior d'Italia* overturned (National Restaurant Association 2002). This ruling allows the Internal Revenue Service (IRS) to use credit card tips to estimate a server's total tips, and

[2] The buyer monitoring story, developed by Jacob and Page (1980), states that tipping exists because the customer, rather than the manager, has the comparative advantage in monitoring the server. Equity theory (Adams 1965) states that people consider equity when leaving a tip. A relationship is equitable when the output-input (service-tip) ratio for the server equals the output-input (tip-service) ratio for the tipper. Thus, higher service on the part of the former requires a higher tip on the part of the latter to restore equity.

then bill that server's restaurant for FICA taxes on the difference between this estimate and the server's reported tips. The Supreme Court's decision, however, is based implicitly on the premise that consumers who pay their bill with cash tip the same as those who pay with a credit card, which may not be legitimate. For example, if consumers who use a credit card to pay their bill also have on average higher incomes than those who use cash, this might translate into the former tipping more than the latter. The relationship between payment method and tip size has been addressed in both Lynn and Latane (1984) and Lynn and McCall (2000b), who find that consumers who pay their bills with a credit card tip higher than those who pay with cash.

The contribution of this paper is to address these questions anew using both point-of-sale survey data and laboratory experiments. The survey was administered to customers as they were leaving several restaurants in the Richmond, Virginia, area during the summer of 2002, and is similar to the surveys used in previous tipping studies (e.g., Conlin, Lynn, and O'Donoghue 2003). A series of laboratory experiments were also conducted in November 2002 at Virginia Tech's Laboratory for the Study of Human Thought and Action (http://lshta.vt.edu). Although the use of experiments as a research tool is not a new phenomenon, few researchers have used laboratory experiments to study tipping. Ruffle (1998) developed an experiment that resembles a tipping situation but did not use it to examine tipping determinants. Bodvarsson and Gibson (1999) and Rogelberg et al. (1999), on the other hand, used experiments to examine tipping determinants but failed to both create an environment that resembles a tipping situation and to provide their subjects with proper incentives (they did not pay their subjects). Incentives are important, because what people say they will do in a given situation is often different from what they actually do, especially in situations involving prosocial preferences.[3]

There are two advantages to using survey data in combination with experimental data. First, the two data sets have complementary strengths. The incentive structure in experiments ensures that responses are genuine, but the laboratory environment lacks external validity and may not accurately capture aspects of behavior that occur in field settings. Alternatively, the survey data, while more realistic, suffer from the fact that some respondents might provide insincere responses. Second, by comparing the results from both the survey and the experiment, I am able to test the experiment's external validity.[4]

There are also advantages to using my own survey data, as opposed to borrowing data from another author. First, to the best of my knowledge, no authors have included a question on their survey that addresses the respondent's belief regarding the tip norm. Such a question allows me to examine letdown aversion as an explanation of why consumers tip. Second, while the data used in this paper were collected using methods similar to those used by other authors, they were collected at different restaurants and in a different geographic region of the United States. It is

[3] See Camerer and Hogarth (1999) for a survey of the effects of monetary incentives in experiments. They argue that incentives are particularly important in situations where the behavior might be socially sanctioned. If tipping is a good thing, then subjects who are not making a real monetary tradeoff may overstate their preferences for transferring money to the server.

[4] The issue of external validity is rarely investigated in experimental studies, despite its obvious importance. Notable exceptions are the research agendas on charitable giving of James Andreoni and his collaborators and on risk preferences of Catherine Eckel and her coauthors. Andreoni, Brown, and Rischall (2003) use field data to confirm estimates of elasticities of giving from laboratory experiments in Andreoni and Vesterlund (2001). Eckel, Johnson, and Montmarquette (2004) examine the relation between laboratory measures of risk preferences and long-term investment behavior. Eckel and Grossman (2004) replicate in a field experiment with Minnesota Public Radio the results reported in Eckel and Grossman (2003).

important for researchers to continue to collect more data so that stronger conclusions can be made about tipping behavior. For example, meta-analyses such as those by Lynn and McCall (2000a, b) can be made more meaningful with the addition of new data. It would be difficult to conclude, for instance, that older persons tip less than younger persons solely on the basis of a data set collected at restaurants A, B, C, and D in geographic region X of the United States.

This paper is organized as follows. Section 2 presents a simple consumer-based model of restaurant tipping that I will use to generate testable hypotheses relating to the issues addressed here in section 1. Sections 3 and 4, respectively, present results from both a tipping experiment and a survey data analysis, while section 5 concludes the paper.

2. A Simple Consumer-Based Model of Restaurant Tipping

I present a simple consumer-based model of restaurant tipping. It differs from Azar (2004) in that it is not dynamic: while I do include a tip norm variable in the model, I am not interested in how it evolves over time. Instead, the model resembles more closely that of Conlin, Lynn, and O'Donoghue (2003), but with two additional factors. Here, the consumer cares not just about his or her tip, but about the tip of the table as well. The model also incorporates the consumer's concern for status, and includes as a control the income of the tipper. As shown below, the latter is done in order to effectively model the effect of table size on tip size, and also to address the issues of both sex differences and the effect of method of bill payment on tip size. Finally, Conlin, Lynn, and O'Donoghue also model server preferences, whereas I do not.

Consider a representative consumer i, who dines at a table of size n, in a restaurant R. I assume that consumer i chooses a percentage tip, T_i, at the end of his or her meal to maximize his or her utility, which is given by

$$U_i = \phi - \beta_i p(1 + T_i) + \gamma_i\left(T_i - \psi_i\left(s, t_i^o\right)\right)\omega_i(n) + \gamma_i\left(\tau - \psi_i\left(s, t_i^o\right)\right). \tag{1}$$

The first two terms in Equation 1 represent, respectively, consumer i's utility from food and the disutility that he or she receives both from paying the bill and leaving a tip, as doing so requires him or her to part with some of his or her money. The price of the meal is given by p, while consumer i's marginal utility of income is given by β_i.

The third term in Equation 1 represents both consumer i's disutility from not adhering to the tip norm, which is given by the function $\gamma_i\left(T_i - \psi_i\left(s,t_i^o\right)\right)$, as well as his or her concern for status, which is given by $\omega_i(n)$. The function γ represents consumer i's utility from tipping, and is increasing and concave in its argument $\left(T_i - \psi_i\left(s,t_i^o\right)\right)$. The function ψ, which yields consumer i's service-adjusted tip norm, is increasing and separable in both s, which is the service quality that consumer i receives from the server, and t_i^o, which is consumer i's *ex ante* belief regarding the tip norm.[5] Finally, the function ω describes consumer i's concern for status and is increasing in n. Status is incorporated into the model because I assume that status is why consumer i might tip more as table size increases.

[5] The intuition behind the function ψ is that consumer i enters the restaurant with an *a priori* belief about how much to tip (t_i^o), which might get adjusted, either upwards or downwards, depending on the service received (s).

The last term in Equation 1 represents consumer *i*'s disutility from the table not adhering to the tip norm, and is given by $\gamma_i(\tau - \psi_i(s,t_i^o))$. Here, consumer i compares the average tip size of the table, which is given by $\tau = [(n-1)/n]\Delta + (1/n)T_i$, to his or her service-adjusted tip norm. Note that Δ is the average tip size of the table, excluding consumer *i*'s tip, and that the functions γ and ψ are the exact same functions addressed in the previous paragraph. The table's tip is incorporated into the model as a way to allow consumer *i* to free ride on the tips of his or her fellow diners.[6]

Utility maximization for consumer *i* with respect to T_i yields the following first-order condition:

$$\Omega = \partial U_i/\delta T_i = -\beta_i p + \gamma_i'(T_i - \psi_i(s, t_i^o))\omega_i(n) + \gamma_i'(\tau - \psi_i(s, t_i^o))[1/n] = 0.$$

The second-order derivative is given by

$$\partial\Omega/\partial T_i = \partial^2 U_i/\partial T_i^2 = \gamma_i''(T_i - \psi_i(s, t_i^o))[\omega_i(n)] + \gamma_i''(\tau - \psi_i(s, t_i^o))[1/n]^2. \quad (2)$$

Imposing symmetry, so that $T_i = \Delta$ in equilibrium, Equation 2 reduces to

$$\Gamma = \partial\Omega/\partial T_i = \partial^2 U_i/\partial T_i^2 = \gamma_i''(T_i - \psi_i(s, t_i^o))\left[\omega_i(n) + 1/n^2\right]. \quad (3)$$

While it is necessary that $\gamma_i'' \leq 0$ for U to be concave, I assume that $\gamma_i'' < 0$, so that U is strictly concave. Thus, referring to Equation 3, $\Gamma < 0$.

Using the Implicit Function Theorem and, again, imposing symmetry so that $T_i = \Delta$ in equilibrium, I obtain the following comparative statics of interest:

$$\partial T_i/\partial\beta_i = (-p)/-\Gamma < 0, \quad (4)$$

$$\partial T_i/\partial s = \{-\gamma_i''(T_i - \psi_i(s, t_i^o))[\partial\psi_i/\partial s][\omega_i(n) + 1/n]\}-\Gamma > 0, \quad (5)$$

$$\partial T_i/\partial t_i^o = \{-\gamma_i''(T_i - \psi_i(s, t_i^o))[\partial\psi_i/\partial t_i^o][\omega_i(n) + 1/n]\}-\Gamma > 0, \quad (6)$$

$$\partial T_i/\partial n = \{\gamma_i'(T_i - \psi_i(s, t_i^o))[\omega'_i(n) - 1/n^2]\}/-\Gamma \,?\, 0. \quad (7)$$

These comparative statics, in turn, yield testable hypotheses. Beginning first with the issue of why consumers tip in restaurants, I consider two explanations: reciprocity and letdown (guilt) aversion. Again, reciprocity refers to the idea that people reward kind actions and punish unkind actions. Applied to tipping, it implies a positive relationship between service quality and tip size, like in Equation 5. Hence the following:

Hypothesis 1. The relationship between tip size and service quality is positive.

There are other reasons, as well, why tips might increase in service quality. For example, people may want to motivate better future service. Empirical testing of this, however, reveals that people do not consider future service when they tip (Azar 2005).

It might also be the case that the norm is to tip more for better service. For example, according to *The Amy Vanderbilt Complete Book of Etiquette*, "if the service is inefficient or unbearably slow, you have reason to reduce the tip to the minimal amount" (Tuckerman and Dunnan 1995). Tuckerman and Dunnan also write: "Today, fifteen percent is standard in most

[6] This comes from the fact that $\partial^2\tau/\partial T_i\partial n < 0$, which says that as table size increases, the impact of consumer *i*'s tip on the table's tip diminishes.

restaurants, although in a first class establishment, if the food is outstanding and the service impeccable, you might give twenty percent." Of course, one reason why the norm might be to tip more for better service is because of reciprocity concerns. Support for this is given by Tuckerman and Dunnan who, in referring to tipping, state: "It is a reward for good service."

Letdown aversion implies that a consumer's tip will depend positively on what the consumer thinks the server thinks the consumer will tip. Recall from section 1 that I use the consumer's belief regarding the tip norm as a proxy for this. Thus, Equation 6 yields:

Hypothesis 2. The relationship between tip size and the customer's belief regarding the tip norm is positive.

Of course, other reasons might exist to explain why the relationship between tip size and the customer's belief regarding the tip norm is positive. For example, such a relationship could hold because people simply do not like deviating from social norms, not because they do not want to let their server down. However, these two explanations are actually intertwined. For example, one reason why people dislike deviating from norms relates to the possible stigma, and resulting less favorable social treatment, attached to doing so.[7] In a tipping situation, such a stigma would come from both the server and other customers; thus, people do not want to let their server down, so as not to be stigmatized.

I also consider three aspects of the tipping situation that influence how much consumers tip in restaurants. Looking first at the effect of table size, it can be seen in Equation 7 that the model predicts an ambiguous effect. Hence:

Hypothesis 3. If free-riding considerations dominate status considerations, then tip size will fall with table size. Alternatively, if status considerations dominate free-riding considerations, tip size will increase with table size.

Again, this is because, as table size increases, consumer i has an incentive to both increase his or her tip because of status considerations, and to decrease his or her tip because of free-riding considerations.

Hypotheses 4 and 5 are more indirect. Regarding sex differences, recall that men earn about 35% more than women. The law of diminishing marginal utility implies then, that males will have a lower β_i than females. Combining this with Equation 4 yields:

Hypothesis 4. Males tip more than females.

Eckel and Grossman (1998), however, point out that women are more generous than men in dictator-type settings, settings that closely resemble tipping.[8] This could translate into females tipping more than males.

Finally, regarding the effect of payment method on tip size, if customers who use a credit card to pay their bill also have on average higher incomes than those who use cash, and thus lower β_i values, then Equation 4 yields:

Hypothesis 5. Customers who pay their bill by credit card tip more than cash-paying customers.

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[7] Conlin, Lynn, and O'Donoghue (2003) cite several papers in their discussion of social norms that are enforced by the threat of direct social sanctions (i.e., less favorable social treatment), including those by Akerlof (1980), Axelrod (1986), Elster (1989a, 1989b), Besley and Coate (1992), Bernheim (1994), Lindbeck, Nyberg, and Weibull (1999), Posner and Rasmusen (1999), and Fehr and Gachter (2000).

[8] The standard dictator game has to do with the division of a fixed pie between two people by only one person. Assume a pie size of x and two players, A and B. Suppose A is the dictator and B is the recipient. A determines an allocation of x between himself and B. Once the allocation is decided upon by A, the game is over, and both players receive the allocation that A determined. Player B, who makes no decisions in such a game, is essentially at the mercy of player A.

In further support of Hypothesis 5, Feinberg (1986) provides evidence that people spend more when using a credit card. There are also studies that find that credit card insignia, which are often imprinted onto bill trays, are associated with higher tips (e.g., McCall and Belmont 1996).

3. Study 1: A Tipping Experiment

In this section, I use a laboratory experiment to examine Hypotheses 1, 3, and 4. Hypotheses 2 and 5 were not addressed using the experiment.

Experimental Design

Subjects participate in dictator games in which the pie size is determined endogenously. They are first assigned either a Dictator or Recipient role and then placed in separate rooms. The Recipients complete a skills test (a word-search game), and their scores are then ranked according to the number of words they circled correctly, with their ranking determining which of two pie sizes ($14 or $28) is allocated to them. Each Dictator is then randomly matched with a Recipient to divide the pie size that the Recipient earned. The Dictator chooses how much of the pie to keep for him- or herself, and how much to transfer to the Recipient. The earned allocation of one of the two pie sizes is analogous to the production of service quality,[9] while the Dictator's subsequent transfer is analogous to a "tip."

The experimental design used in this paper is inspired by Ruffle (1998). His paper has two treatments: one set of subjects participates in a standard dictator game, and another set participates in dictator games in which the pie size is determined endogenously by the effort of the recipient. In both games, there are two possible pie sizes. In the standard game, the pie size is chosen by luck, whereas in the endogenous game, the recipient earns one of the pie sizes. The difference between the offer in the latter game and the offer in the former is construed to be a "tip." I construe the tip to be the percentage of the pie offered to the Recipient. Ruffle's design and definition of tipping has slightly more ecological validity. Because of the added complexity and cost, however, I use a simpler design. Since my interest is primarily in the comparative statics across treatments, little is lost as a result.

The experiment is a within-subjects design, and varies three factors—service, table size, and information—in seven treatments. Varying service by allowing the Recipients to earn one of two pie sizes allows me to test Hypothesis 1. Varying table size by having Dictators make their offers in the presence of different numbers of other dictators allows me to test Hypothesis 3. I consider table sizes of one, two, three, and six persons. Finally, Dictators make their offers both publicly, so that everyone else at their table sees their offer, and privately, so that no one else at their table sees their offer, across each table size. Public tipping provides Dictators with the opportunity to display status, if they so desire, which is necessary to adequately test Hypothesis 3. I test Hypothesis 4 as well, via the use of a postexperiment questionnaire that collects demographic data. The questionnaire is discussed in further detail in the next section. Subjects were paid for a single, randomly chosen decision, determined by a die roll at the end of the experiment.

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[9] My experiment treats service quality as exogenous, which I believe is more realistic. However, service quality can also be viewed as endogenous, as in Bodvarsson, Luksetich, and McDermott (2003).

A typical session consists of twelve Dictators and two Recipients who, again, participate in all seven treatments (one-person table, two-person table private, two-person table public, three-person table private, three-person table public, six-person table private, six-person table public). In each treatment, each Dictator is randomly paired with one of the two anonymous Recipients to make an allocation decision. As there are only two Recipients, yet twelve Dictators, each Recipient is always paired with six Dictators in a given treatment.[10] Also, Dictators sitting at the same table are always paired with the same Recipient. Finally, a Recipient's service level is not necessarily constant across each treatment (in a given session, each Recipient will perform seven word searches).

In order to make the mechanics of the experiment more transparent, consider the following example. A Dictator at a three-person table under the private information treatment sits at a table with two other Dictators, all of whom are assigned the same Recipient. A total of four such tables exist in the room, with each of the two Recipients randomly assigned to two of the tables. Suppose Recipient X, based on his or her performance on the word search, earns the $28 pie size. This means that each of three Dictators at two different tables will determine how much of a $28 pie to allocate to Recipient X. Each Dictator at each table privately makes his or her allocation decision on a decision sheet and then folds the decision sheet in half. In the public information treatment with three-person tables, there is a single decision sheet in the center of each of the four tables. Each Dictator writes down, at his or her own pace, the allocation amount on his or her table's decision sheet. Allocations are observed by all others at the table.

Experimental Procedure

A total of 112 Virginia Tech students participated in the experiment in November 2002. Subjects were randomly assigned to either the Recipient or Dictator role upon showing up at the experiment, and participated only once and in a single role. Eight sessions, each lasting roughly 1 hour and 45 minutes, were conducted at Virginia Tech's Laboratory for the Study of Human Thought and Action, using the same two experimenters (one male, one female) in the same role. Treatment order was randomized over each of the eight sessions, and while there do appear to be order effects for which I am unable to offer any explanation, I control for them in my econometric analysis of the data.[11]

At the end of the experiment, subjects completed a postexperiment questionnaire, and were then paid, privately, a $5 show-up fee, as well as additional earnings based on their chosen decision in one of the treatments. Dictators earned, on average, $23.23, while Recipients earned, on average, $21.55. An abridged copy of the instructions is provided in Appendix A.

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[10] This design mimics the typical practice of assigning a server to several, and not just one, tables. I did not incorporate additional Recipients into the experiment because I wanted to keep the experiment as simple as possible. For example, adding additional Recipients would have required me to incorporate additional pie sizes.

[11] Treatment order was randomized before a given session by placing seven pieces of paper, each representing one of the seven treatments, into a bag. The order in which the seven pieces of paper were pulled out of the bag yielded the treatment order for that particular session. Treatment order effects do appear to exist in the data, and I control for them in my econometric analysis; however, as can be seen in Table 4, the main results of the analysis are robust to such controls.

Table 1. Description of Variables

Variable	Description
%tip	% of pie offered to Recipient
$tip	$ amount of pie offered to Recipient
tip_{-1} (%)	Lag of %tip
tip_{-1} ($)	Lag of $tip
tablesize	Table size
public	Dummy equal to 1 if tip made publicly, 0 otherwise
goodservice	Dummy equal to 1 if recipient earned $28 pie, 0 otherwise
male	Dummy equal to 1 if Dictator male, 0 otherwise
oppositesex	Dummy equal to 1 if Dictator's table consisted of at least 1 member of opposite sex, 0 otherwise
age	Dictator's age
birthorder	Dictator's birth order
white	Dummy equal to 1 if Dictator white, 0 otherwise
religious	Dummy equal to 1 if Dictator regularly attends religious services, 0 otherwise
econ	Dummy equal to 1 if Dictator has taken at least 1 economics course, 0 otherwise
#siblings	Number of Dictator's brothers and sisters
serverinfamily	Dummy equal to 1 if any family or friends of the Dictator have ever been a restaurant server, 0 otherwise
exserver	Dummy equal to 1 if Dictator has ever been a restaurant server, 0 otherwise
S1, S2, S3, S4, S5, S6	Session dummies

Data and Econometric Specification

The experiment originally produced 672 observations; 586 are used in the analysis. One of the sessions is dropped entirely due to the fact that nearly all of the Dictators in that session offered zero to their Recipients across all seven treatments. With no variation across treatments, there is nothing to analyze in these data, which are notably different from all the rest. This behavior was probably the result of a statement made at the beginning of the experiment by one of the Dictators, to the effect of "Why would you ever give any money at all to them?" Two outlying observations in which the Dictator offered 100% of the pie to the Recipient were also dropped from the analysis, since the inclusion of these outlier data points yielded markedly different results. A description of the variables used in the analysis, several of which are control variables used to adjust for subject-specific characteristics, is provided in Table 1. Summary statistics are provided in Table 2.

The percentage of the pie offered by the Dictator to the Recipient is used as the dependent variable in the analysis.[12] Because a large portion of the Dictators offered $0 to their Recipients, the data are left-censored at zero. In addition, subjects make a series of allocation decisions across seven treatments. I address these issues by estimating a Tobit random-effects model.

[12] Percent tip was chosen as the dependent variable both here and in Study 2 because, according to Mills and Riehle (1987), survey evidence shows that 70% of people figure their tips based on a percentage of the check. I suspect that this still holds true today, in that many restaurants offer tip suggestions at the bottom of their checks, depending on the percentage tip the customer wishes to leave (usually 15%, 18%, and 20%).

Table 2. Summary Statistics (N = 586)

Variable	Mean	Standard Deviation	Min	25th Percentile	Median	75th Percentile	Max
%tip	15.70	16.97	0.00	0.00	10.71	28.57	92.86
$tip	3.34	3.83	0.00	0.00	2.00	5.00	25.00
tip_{-1} (%)	16.44	16.97	0.00	0.00	14.29	28.57	100.00
tip_{-1} ($)	3.52	3.95	0.00	0.00	2.00	5.00	20.00
tablesize	3.28	1.83	1.00	2.00	3.00	6.00	6.00
public	0.43	0.50	—	—	—	—	—
goodservice	0.50	0.50	—	—	—	—	—
male	0.55	0.50	—	—	—	—	—
oppositesex	0.62	0.48	—	—	—	—	—
age	19.90	2.64	17.00	19.00	19.00	20.00	33.00
birthorder	1.81	0.99	1.00	1.00	2.00	2.00	7.00
white	0.74	0.44	—	—	—	—	—
religious	0.33	0.47	—	—	—	—	—
econ	0.98	0.15	—	—	—	—	—
#siblings	1.53	1.07	0.00	1.00	1.00	2.00	6.00
serverinfamily	0.73	0.45	—	—	—	—	—
exserver	0.21	0.41	—	—	—	—	—

Results

Hypothesis 1: I first consider the issue of whether the theory of reciprocity helps to explain why consumers tip in restaurants. Recall that reciprocity implies a positive relationship between the size of the tip and service quality. Applied to the experiment, reciprocity requires that a Recipient's earning of the higher pie size should result in a higher percentage offer of the pie from the Dictator. Looking at Table 3, it can be seen that Recipients who earned the $14 pie size received an average tip of 15.01%, while those who earned the $28 pie size received an average tip of 16.38%, a difference of 1.37 percentage points (p = 0.166, one-tailed t-test).[13]

[13] A one-tailed test was performed because of the very strong *a priori* belief that this relationship will not be negative. This belief is guided by the fact that not a single previous study of the effect of service quality on tip size finds such an effect. However, there is a plausible reason why this relationship could be negative. Tip is measured as a percentage of pie size. As the pie size becomes larger, it becomes more costly to give the Recipient a certain percentage of the pie size, thus giving the Dictator an incentive to give a lower percentage.

Table 3. Mean Percent Tip by Treatment

Variable	N	Mean Percent Tip
Male (male = 1)	321	18.73
Female (male = 0)	265	12.02
$28 Pie (goodservice = 1)	293	16.38
$14 Pie (goodservice = 0)	293	15.01
One-person table (tablesize = 1)	84	17.04
Two-person table (tablesize = 2)	168	17.13
Three-person table (tablesize = 3)	168	15.90
Six-person table (tablesize = 6)	166	13.36
Public tip (public = 1)	251	15.82
Private tip (public = 0)	335	15.60

Together with the multivariate analysis given in the first column of Table 4, this suggests that the relationship between tip size and service quality is weak at best ($p = 0.149$, one-tailed). Table 4 also reveals that the relationship between absolute tip and service quality is significant. It is not too surprising though, that Dictators give higher absolute amounts of money to Recipients who earn the higher pie size. Actually, the larger the difference between the low and high pie size amounts, the more likely it probably is that the relationship between absolute tip and service quality is significant. This is another reason why I rely on the percent tip measure here.

Hypothesis 3: Next, I examine the relationship between tip size and table size. Table 3 lends some credence to a negative relationship, in that average tip size was roughly the same at one- and two-person tables ($p = 0.973$, two-tailed t-test), but 1.23 percentage points smaller at three-person tables than at two-person tables ($p = 0.496$, two-tailed t-test), and 2.54 percentage points smaller at six-person tables than at three-person tables ($p = 0.141$, two-tailed t-test). The multivariate analysis given in the first column of Table 4 confirms this ($p = 0.083$, two-tailed). A one-person increase in table size results in a .6 percentage point decrease in tip size. It should be noted that this result is not robust across dependent variable specification (percent tip vs. absolute tip). Although, again, there are issues with using absolute tip as the dependent variable here, as I alluded to at the end of my discussion of the Hypothesis 1 results.

Hypothesis 4: Finally, I consider sex differences in tipping. According to Table 3, male Dictators tipped an average of 18.73%, while female Dictators tipped an average of only 12.02%, a difference of 6.71 percentage points ($p < 0.001$, two-tailed t-test). The multivariate analysis given in the first column of Table 4 confirms this difference ($p = 0.007$, two-tailed). Further, as Table 4 illustrates, this result is robust across dependent variable specification (percent tip vs. absolute tip).

The control variables yielded some interesting findings as well (refer to the first column of Table 4). Not surprisingly, percentage tip was higher in the public treatments than in the private treatments ($p = 0.072$, two-tailed); however, this result is not robust across dependent variable specification (percent tip vs. absolute tip). Also, the data exhibited some dependence, in that a subject's percentage tip in a given treatment depended on that subject's percentage tip in the previous treatment ($p = 0.002$, two-tailed). This finding is robust across dependent variable specification (percent tip vs. absolute tip). Finally, older subjects tipped more than younger subjects ($p = 0.001$, two-tailed), and white subjects tipped 5.19 percentage points less than nonwhite subjects ($p = 0.024$, two-tailed), both of which are findings that are robust across dependent variable specification (percent tip vs. absolute tip). This latter finding runs counter to previous work examining the effect of ethnographic group on tipping. For example, Lynn (2004) reports on two studies that find that, on average, blacks tip 20% less than whites, and that the difference remains both sizable and statistically significant even after controlling for various demographic characteristics, such as sex, age, education, income, and household size.

To summarize, the findings, for which percentage tip is the dependent variable, from Study 1 are as follows. First, the results are not inconsistent with the theory of reciprocity, although evidence in its favor is statistically weak. Second, the relationship between tip size and table size is negative. Finally, men tip more than women.

Table 4. Results from Tobit Random-Effects Model[a]

	Dep Var % tip		Dep Var $ tip	
tip_{-1}(%)	0.15***	0.17***		
	(.08)	(.08)		
tip_{-1}($)			0.39***	0.42***
			(.05)	(.05)
tablesize	−0.61*	−0.63*	−0.06	−0.07
	(.55)	(.56)	(.12)	(.12)
public	1.88*	1.94*	0.24	0.29
	(1.66)	(1.67)	(.36)	(.36)
goodservice	1.11	1.09	0.93***	0.85***
	(1.69)	(1.71)	(.39)	(.39)
male	4.83***	4.39**	0.92***	0.83***
	(2.85)	(2.89)	(.38)	(.38)
oppositesex	−0.56	−0.60	−0.31	−0.32
	(2.08)	(2.09)	(.45)	(.44)
age	1.16***	1.08***	0.17***	0.16***
	(.56)	(.57)	(.08)	(.07)
birthorder	1.09	0.44	0.08	−0.003
	(1.90)	(1.84)	(.26)	(.24)
white	−5.19**	−4.02*	−0.67*	−0.59*
	(3.65)	(3.30)	(.48)	(.43)
religious	−0.93	−0.47	−0.19	−0.15
	(3.19)	(3.19)	(.43)	(.42)
econ	−2.62	−0.32	−0.30	−0.12
	(8.92)	(8.89)	(1.16)	(1.13)
#siblings	−2.04*	−1.42	−0.28	−0.21
	(1.80)	(1.80)	(.24)	(.24)
serverinfamily	−0.13	0.29	−0.01	0.05
	(3.32)	(3.33)	(.44)	(.43)
exserver	−0.62	−0.78	−0.11	−0.11
	(3.62)	(3.67)	(.49)	(.48)
S1	7.86**		0.76	
	(5.65)		(.76)	
S2	2.43		0.10	
	(5.78)		(.77)	
S3	0.83		−0.26	
	(5.47)		(.73)	
S4	7.86**		0.83	
	(5.58)		(.74)	
S5	5.40		0.48	
	(5.47)		(.73)	
S6	3.28		0.15	
	(5.59)		(.74)	
constant	−16.97*	−14.90*	−3.04**	−2.78**
	(13.81)	(13.72)	(1.87)	(1.79)
χ^2	76.09	56.53	303.52	292.30
Pseudo-R^2	.254	.220	.402	.388
Log-likelihood	−1575.22	−1580.56	−1042.93	−1046.75
Adjustment factor[a]	.63	.625	.719	.717
N	502	502	502	502

[a] The coefficients presented here have been adjusted by the adjustment factor listed in this table. This adjustment factor is used to obtain the partial effects of the independent variables on the observed variable *y*, instead of the latent variable *y** (see Wooldridge 2000 or Maddala 1983). *, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively (all two-tailed).

4. Study 2: Survey Data Analysis

In this section, I use a survey data set to examine Hypotheses 1–5. A copy of the survey is provided in Appendix B. Finally, section 5 compares the results from both the survey and the experiment as a test of the experiment's external validity.

Description of Survey

Beginning first with the issue of why consumers tip in restaurants, recall that reciprocity implies a positive relationship between the size of the tip and service quality (Hypothesis 1). Question 9 on the survey addresses this by asking respondents to rate the quality of service that they received from their server on a seven-point scale. If letdown aversion motivates consumers to tip, then consumers should tip positively in response to their belief regarding the tip norm (Hypothesis 2). Question 20 addresses this by asking respondents what they believe the norm is regarding percent tip in a restaurant.

Hypotheses 3–5 relate to factors influencing how much consumers tip in restaurants: table size, sex, and method of bill payment. Regarding table size, questions 1 and 2 on the survey ask respondents to report, respectively, the number of people at their table and the number of checks at their table. The latter question is important because someone tipping for an entire nine-person table, for example, might tip differently than if he or she were only tipping for five of the nine persons at the table. Regarding sex, question 14 on the survey asks respondents to report their sex. Finally, regarding method of bill payment, question 7 on the survey asks respondents how they paid for their bill.

The second parts of questions 4 and 5 are used as filters. They ask, respectively, whether or not the respondent received help in both paying the bill and leaving the tip. I did not want to include in the analysis customers who paid for the bill, but who were assisted by others in paying either the tip or the bill. In either of these cases, the customer's tip that is recorded on the survey may not accurately reflect that customer's tipping behavior. I also deleted observations for which a "yes" response was recorded for question 6, because if the tip is automatically added to the bill, there is nothing to learn from the size of the tip. The remaining questions on the survey are used as control variables.

Procedure

I collected survey data from five Richmond, Virginia, restaurants in the summer of 2002.[14] At each restaurant, the data were collected over the course of a weekend, on Friday and Saturday evenings, from 6:00 P.M. until about 10:00 P.M. Customers were approached as they exited the restaurant, and the same two people, both myself and an assistant, administered the survey at all five of the restaurants. In the interest of obtaining more reliable responses, survey respondents completed the survey privately (via clipboard, with pen attached), and were asked to fold and place their completed survey in a box. A total of 485 surveys were collected out of 575 attempts, yielding a response rate of 84.3%.

[14] The reason why I collected data from these five restaurants, instead of other restaurants, is because these restaurants were the only ones willing to let me survey their customers. Collecting field data is not an easy task. For example, I asked approximately 25 restaurants for permission to survey their customers, and only six obliged.

Data and Econometric Specification

I began the analysis with a total of 485 observations. After cleaning the data, 216 observations remained. All observations for which a "yes" response was recorded for the second part of either question 4 or question 5, indicating that the person was not responsible for the tip, were deleted. Also, observations for which a "yes" response was recorded for question 6 were deleted.[15] The data were further cleaned by deleting those observations for which respondents either did not provide a response, or for which respondents provided an ambiguous response, to the most critical questions on the survey: questions 1–7, 9–18, and 20.[16] A description of the variables used in the analysis and summary statistics are provided in Table 5 and Table 6, respectively.

Percentage tip is used as the dependent variable in the analysis.[17] The data were estimated using a Feasible Generalized Least Squares (FGLS) model because a Cook-Weisberg test (Cook and Weisberg 1983) revealed heteroskedasticity in the data ($p < 0.001$). Such a model is essentially a weighted least-squares procedure that corrects for heteroskedasticity. Weights are obtained by taking the log of the squared residual of the original model and then regressing this on the model's independent variables. This yields a new model. The fitted values, F, of this model are obtained and the weight is calculated as the square root of e^F.

Results

Hypothesis 1: Again, reciprocity implies a positive relationship between the size of the tip and service quality. Looking at Table 7, it can be seen that respondents who received good service tipped an average of 20.43%, while those who received bad service tipped an average of only 17.50%, a difference of 2.93 percentage points ($p = 0.037$, one-tailed t-test).[18] The multivariate analysis presented in the first column of Table 9 confirms this difference ($p = 0.001$, one-tailed). As a robustness check, the additional columns displayed in Table 9 reveal that this result holds regardless of dependent variable specification (absolute tip vs. percent tip), and that the result is mildly sensitive to how service quality is defined. Regarding the latter, where service quality is partitioned into the dummy variables "goodserv" and "badserv", goodserv and badserv are significant across neither the absolute tip nor the percent tip specifications.

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[15] The automatic service charge policies of each restaurant were, for the most part, similar. Melito's states on its menu that a 17.5% gratuity is added for parties of five or more, whereas Shackleford's and Grapevine II impose, respectively, service charges of 17% and 18% for parties of eight or more. Memphis BBQ makes no reference to an automatic service charge policy on its menu, but rather requests that parties of eight or more pay with one check only. Finally, Extra Billy's does not provide an automatic service charge policy on its menu.

[16] The reason why questions 8 and 19 are not considered critical is because too many respondents either left these questions blank or answered them ambiguously. Had I decided to consider these questions critical, my sample size would have been much smaller than 216. Questions 21–23 are not considered critical because they add nothing to the analysis.

[17] Refer to footnote 12 in section 3 regarding why percent tip was chosen as the dependent variable.

[18] Table 8 provides a detailed distribution of average percent tip over service.

Table 5. Description of Variables

Variable	Description
$tip	$ amount of tip
%tip	Tip as percentage of bill
billsize	Size of bill
billsize2	Size of bill squared
tablesize	Table size
tablesize2	Table size squared
age	Age of tipper
age2	Age of tipper squared
#checks	Number of checks at table
goodservice	Dummy equal to 1 if tipper's service rating equals 6 or higher; 0 otherwise
goodserv	Dummy equal to 1 if tipper's service rating equals 5 or higher; 0 otherwise
badserv	Dummy equal to 1 if tipper's service rating equals 3 or lower; 0 otherwise
service	Tipper's rating of service quality (7-point scale)
highincome	Dummy equal to 1 if question 18 on survey equals fourth or fifth response; 0 otherwise
highinc	Dummy equal to 1 if question 18 on survey equals fourth or fifth response; 0 otherwise
lowinc	Dummy equal to 1 if question 18 on survey equals first or second response, 0 otherwise
income	Tipper's income level (i.e., income = 1 if tipper circled first response on question 18 on survey)
tipnorm%	Tipper's belief regarding percentage tip norm
tipnorm$	tipnorm% × billsize
credit/atm card	Dummy equal to 1 if tipper paid by credit card or ATM card, 0 otherwise
male	Dummy equal to 1 if tipper male, 0 otherwise
exserver	Dummy equal to 1 if tipper was ever a server, 0 otherwise
eb	Restaurant dummy equal to 1 if restaurant Extra Billy's, 0 otherwise
memphis	Restaurant dummy equal to 1 if restaurant Memphis BBQ, 0 otherwise
melito	Restaurant dummy equal to 1 if restaurant Melito's, 0 otherwise
grapevine	Restaurant dummy equal to 1 if restaurant Grapevine II, 0 otherwise
maleserver	Dummy equal to 1 if server male, 0 otherwise
religious	Dummy equal to 1 if tipper regularly attends religious services, 0 otherwise
married	Dummy equal to 1 if tipper married, 0 otherwise
friday	Dummy equal to 1 if survey data collected on Friday, 0 otherwise
regularcustomer	Dummy equal to 1 if question 11 on survey equals 6 or higher; 0 otherwise
highdiningfrequency	Dummy equal to 1 if question 11 on survey equals 5 or higher; 0 otherwise
lowdiningfrequency	Dummy equal to 1 if question 11 on survey equals 3 or lower; 0 otherwise
diningfrequency	Tipper's response to question 11 on survey

Hypothesis 2: Letdown aversion implies a positive relationship between the size of the tip and respondents' beliefs about the tip norm. The results presented in Table 7 lend credence to this, in that those respondents who believe that the tip norm is 15% tipped 1.57 percentage points more than those who believe that the tip norm is 10% ($p = 0.397$, two-tailed t-test), and

Table 6. Summary Statistics (N = 216)

Variable	Mean	Standard Deviation	Min	25th Percentile	Median	75th Percentile	Max
$tip	6.26	3.27	1.30	4.00	5.50	8.00	20.00
%tip	19.63	10.70	2.94	16.22	18.67	20.22	153.16
billsize	34.49	18.69	3.95	22.00	30.00	42.61	104.00
billsize2	1537.05	1807.34	15.60	484.00	900.00	1815.76	10816.00
tablesize	2.72	1.14	1.00	2.00	2.00	3.50	8.00
tablesize2	8.69	8.37	1.00	4.00	4.00	12.50	64.00
age	46.56	12.09	22.00	37.00	47.00	55.00	77.00
age2	2313.37	1172.77	484.00	1369.00	2209.00	3025.00	5929.00
#checks	1.21	0.60	1.00	1.00	1.00	1.00	6.00
goodservice	0.73	0.45	—	—	—	—	—
goodserv	0.91	0.28	—	—	—	—	—
badserv	0.03	0.18	—	—	—	—	—
service	5.94	1.09	1.00	5.00	6.00	7.00	7.00
highincome	0.82	0.38	—	—	—	—	—
highinc	0.82	0.38	—	—	—	—	—
lowinc	0.03	0.18	—	—	—	—	—
income	4.37	0.88	1.00	4.00	5.00	5.00	5.00
tipnorm%	16.27	2.99	3.00	15.00	15.00	20.00	20.00
tipnorm$	5.63	3.29	0.78	3.30	4.88	7.25	20.80
credit/atm card	0.63	0.48	—	—	—	—	—
male	0.67	0.47	—	—	—	—	—
exserver	0.25	0.43	—	—	—	—	—
eb	0.16	0.37	—	—	—	—	—
memphis	0.19	0.40	—	—	—	—	—
melito	0.26	0.44	—	—	—	—	—
grapevine	0.16	0.37	—	—	—	—	—
maleserver	0.31	0.46	—	—	—	—	—
religious	0.47	0.50	—	—	—	—	—
married	0.76	0.43	—	—	—	—	—
friday	0.43	0.50	—	—	—	—	—
regularcustomer	0.19	0.39	—	—	—	—	—
highdiningfrequency	0.32	0.47	—	—	—	—	—
lowdiningfrequency	0.55	0.50	—	—	—	—	—
diningfrequency	3.47	1.93	1.00	2.00	3.00	5.00	7.00

those respondents who believe that the tip norm is 20% tipped 3.89 percentage points more than those who believe that the tip norm is 15% (p = 0.026, two-tailed t-test).[19] The multivariate analysis in the first column of Table 9 confirms this (p = 0.002, two-tailed). Furthermore, as can be seen in the additional columns displayed in Table 9, this result is robust across dependent variable specification (absolute tip vs. percent tip).

Hypothesis 3: Regarding table size, Table 7 reveals a nonlinear relationship between tip size and table size in that respondents at three- and four-person tables tipped 3.76 percentage points less than did respondents at one- and two-person tables (p = 0.018, two-tailed t-test), and respondents at five-, six-, seven-, and eight-person tables tipped 2.6 percentage points more than respondents at three- and four-person tables (p = 0.100, two-tailed t-test). This is confirmed by the multivariate analysis illustrated in the first column of Table 9 (p = 0.001 and

[19] Table 10 provides a detailed distribution of average percent tip over respondents' belief about the tip norm.

Table 7. Mean Percent Tip by Treatment

Variable	*N*	Mean Percent Tip
Good service (goodservice = 1)	157	20.43
Bad service (goodservice = 0)	59	17.50
10% Norm (tipnorm% = 10%)	12	16.96
15% Norm (tipnorm% = 15%)	123	18.53
20% Norm (tipnorm% = 20%)	65	22.42
One-person table (tablesize = 1)	6	28.87
Two-person table (tablesize = 2)	126	20.54
One- and two-person tables combined (tablesize = 1,2)	132	20.92
Three- and four-person tables combined (tablesize = 3,4)	70	17.16
Five-, six-, seven-, and eight-person tables combined (tablesize = 5,6,7,8)	14	19.76
Male (male = 1)	145	20.00
Female (male = 0)	71	18.87
Credit card/ATM (credit/atm card = 1)	137	18.93
Cash/check (credit/atm card = 0)	79	20.83

$p < 0.001$, two-tailed). For table sizes with fewer than three persons, tip size falls with table size, while for table sizes of more than three persons, tip size increases with table size. Also, as illustrated by the additional columns displayed in Table 9, this result is robust across dependent variable specification (absolute tip vs. percent tip).

Hypothesis 4: Regarding sex, according to Table 7, men tipped an average of 20%, compared with women who tipped an average of only 18.87%, a difference of 1.13 percentage points ($p = 0.468$, two-tailed t-test). The multivariate analysis in the first column of Table 9 reveals that this difference is not significant ($p = 0.451$, two-tailed). Further credence is lent to this result by the fact that, in the additional columns displayed in Table 9, this result is robust across dependent variable specification (absolute tip vs. percent tip).

Hypothesis 5: Finally, regarding payment method, Table 7 reveals that respondents who paid their bill using either cash or check tipped an average of 20.83%, while those who paid their bill using either a credit card or an ATM card tipped an average of only 18.93%, a difference of 1.9 percentage points ($p = 0.210$, two-tailed t-test). However, the multivariate analysis in the first column of Table 9 reveals that this difference is not statistically significant ($p = 0.922$, two-tailed). As can be seen via the additional columns displayed in Table 9, this result is robust across dependent variable specification (absolute tip vs. percent tip).

Table 8. Mean Percent Tip by Service

Service	Mean Percent Tip	*N*
1	18.67	1
2	17.66	2
3	17.98	4
4	17.24	12
5	17.50	40
6	19.34	81
6.5	17.38	2
7	21.70	74

Table 9. FGLS Results

	Dep Var % tip			Dep Var $ tip		
constant	18.28***	21.44***	12.67**	3.16***	2.82**	.72
	(4.94)	(4.59)	(5.25)	(1.18)	(1.28)	(1.10)
billsize	−.32***	−.27***	−.33***	.11***	.10***	.11***
	(.07)	(.07)	(.08)	(.02)	(.03)	(.03)
billsize2	.002***	.002***	.003***	−.0002	−.0002	−.0002
	(.0007)	(.001)	(.001)	(.0002)	(.0002)	(.0002)
tablesize	−3.20***	−4.01***	−2.54**	−1.21***	−1.27***	−1.30***
	(.94)	(.91)	(1.00)	(.31)	(.38)	(.35)
tablesize2	.46***	.55***	.39***	.20***	.20***	.20***
	(.10)	(.10)	(.10)	(.04)	(.05)	(.05)
age	.18	.11	.03	−.06	−.02	−.02
	(.18)	(.15)	(.19)	(.04)	(.04)	(.04)
age2	−.003	−.002	−.001	.0004	−.00003	−.0001
	(.002)	(.002)	(.002)	(.0004)	(.0004)	(.0004)
#checks	1.08	1.09**	1.84**	.06	.14	.26
	(.73)	(.55)	(.81)	(.14)	(.17)	(.17)
goodservice	2.06***			.54***		
	(.64)			(.15)		
service			.74**			.19***
			(.30)			(.06)
goodserv		.30			.43	
		(1.69)			(.32)	
badserv		−2.29			−.007	
		(2.96)			(.72)	
highincome	2.25**			.69***		
	(.93)			(.18)		
income			1.23***			.30***
			(.43)			(.08)
highinc		2.95***			.72***	
		(.91)			(.19)	
lowinc		2.92*			.10	
		(1.73)			(.45)	
tipnorm%	.32***	.35***	.37***			
	(.10)	(.09)	(.10)			
tipnorm$				.35***	.36***	.34***
				(.08)	(.08)	(.08)
credit/atm card	.07	−.11	.32	.02	−.01	.08
	(.69)	(.60)	(.69)	(.15)	(.16)	(.16)
male	.50	.40	.64	.001	.08	.19
	(.66)	(.60)	(.64)	(.16)	(.17)	(.16)
exserver	.96	.77	1.10	.22	.17	.35*
	(.62)	(.59)	(.71)	(.19)	(.20)	(.19)
eb	−1.05	−.18	−.71	−.42	−.32	−.36
	(1.03)	(.99)	(1.04)	(.29)	(.30)	(.29)
melito	−.16	.29	−.19	.13	.06	.06
	(.77)	(.72)	(.85)	(.27)	(.27)	(.26)
memphis	−.36	.37	.13	.13	−.04	−.07
	(.85)	(.89)	(.95)	(.28)	(.28)	(.30)
grapevine	−.78	.20	−.89	.04	−.10	−.24
	(.87)	(.80)	(.93)	(.25)	(.25)	(.25)

Table 9. Continued

	Dep Var % tip			Dep Var $ tip		
maleserver	.47	−.23	.15	.10	−.04	.20
	(.71)	(.61)	(.75)	(.17)	(.18)	(.18)
religious	−.56	−.32	−.73	−.10	−.17	−.21
	(.53)	(.50)	(.56)	(.15)	(.16)	(.15)
married	.33	−.38	.20	.13	.09	.17
	(.71)	(.70)	(.79)	(.19)	(.20)	(.19)
friday	.09	.24	.54	−.06	−.06	−.04
	(.53)	(.48)	(.58)	(.14)	(.15)	(.15)
regularcustomer	.88			.29		
	(.71)			(.20)		
diningfrequency			.13			.06
			(.15)			(.04)
highdiningfrequency		−.10			−.06	
		(.82)			(.26)	
lowdiningfrequency		−.85			−.27	
		(.79)			(.25)	
R^2	.933	.905	.956	.748	.777	.791
F-Statistic	353.08	297.94	397.43	288.66	256.41	293.22
N	216	216	216	216	216	216

*, **, and *** indicate significance at the 10%, 5%, and 1% level, respectively (all two-tailed).

The control variables also yielded several interesting findings. For example, people with higher incomes tip more than those with lower incomes ($p = 0.016$, two-tailed), a result that is robust across both dependent variable choice and (mildly) specification of the income variable. For example, where income is partitioned into the dummy variables "highinc" and "lowinc", only "highinc" is significant across both dependent variable specifications, with "lowinc" significant only in the percent tip specification.

To summarize, the findings from the survey data analysis are as follows. First, my findings are consistent with the theories of both reciprocity and letdown aversion as explanations of why consumers tip in restaurants. Second, tip size is a convex function of table size, with a minimum at a table size of three. Finally, the size of the tip depends neither on the sex of the tipper nor the method of bill payment.

Table 10. Mean Percent Tip by Respondents' Belief about Tip Norm

Tipnorm%	Mean Percent Tip	*N*
3%	15.38	1
5%	15.38	1
10%	16.96	12
12%	22.73	1
15%	18.53	123
16%	18.89	1
17%	17.33	2
18%	19.21	10
20%	22.42	65

5. Discussion and Comparison of Results

This paper examined determinants of both why and how much consumers tip in restaurants. Beginning first with the issue of why consumers tip in restaurants, two possibilities were considered: reciprocity and letdown aversion. Both the experimental and survey data lend credence to the former possibility, which implies a positive relationship between tip size and service quality. This finding is consistent with the meta-analysis in Lynn and McCall (2000a), who find that the relationship is positive but tenuous.[20] Credence was also lent to the latter possibility, which was examined using only the survey data, as being a determinant of why consumers tip in restaurants.

Next, I considered three determinants of how much consumers tip in restaurants: table size, sex, and method of bill payment. First, regarding table size, while the experimental data reveal a negative relationship between tip size and table size, the survey data lend credence to a nonlinear relationship.

Second, sex differences, which exist in the experimental but not the survey data, show that males tip more than females, which is consistent with the literature (e.g., Lynn and McCall 2000b). Such differences, however, may not be the result of income differences between males and females. The experimental data consist of students. It is unlikely that the income of male students is higher than that of the female students.

Third, method of bill payment, which was examined using only the survey data, is found not to be a determinant of the size of the tip. This result contrasts with previous studies (e.g., Lynn and Latane 1984; Lynn and McCall 2000b), which find that consumers who use credit cards to pay their bill tip more than those who use cash. However, it could be that these studies included in their data sets a large percentage of business customers, who typically use a credit card and do not mind being generous, since they are not spending their own money. Because my data were collected on Friday and Saturday evenings, it is highly unlikely that my analysis incorporates any business customers.

Finally, as a test of the external validity of the experiment, the results from both the experimental and survey analyses are compared. The tipping experiment initially appears to be externally valid on only one of the three issues for which I am able to make a comparison—the reciprocity explanation of why consumers tip in restaurants. However, a closer look at the effect of table size on tip size across both studies reveals that the experimental data appear to be externally valid on this issue as well. The experimental data, which examined table sizes of one, two, three, and six, reveal a negative relationship between tip size and table size. The survey data reveal a nonlinear relationship, with a minimum at table size of approximately three. However, as only 6.48% of the survey respondents dined at a table size of five or larger, inference should be restricted to table sizes of four or smaller. Thus, just like the experimental data, the survey data reveal a negative relationship between tip size and table size for table sizes of one through three. For table sizes greater than three, the experimental and survey data are not comparable. This finding is consistent with both Lynn and Latane (1984) and Bodvarsson and Gibson (1997), who also find a negative relationship between tip size and table size.

Again, this paper offered two social norms explanations of why consumers tip in restaurants. I also considered three determinants of how much consumers tip in restaurants. In

[20] Recent work by Bodvarsson, Luksetich, and McDermott (2003), which takes service quality to be endogenous, finds that the association between tip size and service quality is strong.

addition to using a unique survey data set, this paper took a novel approach in examining these issues by also using laboratory experiments. The incentive structure in experiments ensures that responses are genuine, but the laboratory environment lacks external validity and may not accurately capture aspects of behavior that occur in field settings. Alternatively, the survey data, while more realistic, suffer from the fact that some respondents might provide insincere responses. Thus, the two data sets complement each other, yielding a much richer analysis than could otherwise be obtained.

The findings in this paper have several implications. First, the result that tip size falls with table size explains the common restaurant practice of adding an automatic service charge onto bills at large table sizes (usually six or more persons). Second, the finding that tip size is not determined by method of bill payment might be of interest to the IRS, as the National Restaurant Association is vigorously trying to get the Supreme Court's ruling in *United States v. Fior d'Italia* overturned (National Restaurant Association 2002). Finally, restaurant servers might want to tailor the way they wait on tables in accordance with some of the findings of this paper. For example, the experimental study in this paper suggests that, on average and *ceteris paribus*, it pays (literally) to be more attentive to a table of males than to a table of females.[21]

Tipping generates billions of dollars each year in the economy and is done by millions of people each day, and not just in restaurants. Hotel workers, barbers, and taxi drivers, just to name a few, also receive tips. There is still much to learn about tipping, and researchers will hopefully continue to focus their attention on this exciting field for years to come.

Appendix A: Experiment Instructions

Because of space considerations, only select instructions are provided below for the experiment presented in this paper. The complete instructions can be obtained from the author at mparrett@vt.edu.

General Instructions—Rooms A and B

(Given in italics are additional instructions provided to Room A. Given in italics and brackets are differences between the A and B instructions, with A's instructions written in the brackets.)

This is an experiment in economic decision-making. You will be paid $5 just for arriving on time. As well, you may earn an additional amount of money.

You have been randomly assigned a role (either A or B), according to the card you drew at the counter. Everyone in this room is in role B [*Everyone in this room is in role A*]. You will be paired with different counterparts in the adjacent room to participate in seven decisions. You will not learn the identity of your counterparts, nor will they learn yours. *In some decisions, you will also be randomly paired with one or more of your coparticipants here in room A. These coparticipant pairings have already been determined beforehand, as such, according to player number. However, as you have not yet received your player number, and player numbers will be distributed randomly, these coparticipant pairings are random.*

The card you are about to receive has several numbers written on it. One of these numbers is your **player number**, and is labeled as such. Your **player number** will be used for payment purposes. The other numbers on the card are your **decision-maker numbers**. You will have a different, and unique, **decision-maker number** in each of the seven decisions. *Keep this card handy at all times, as you will need to refer to it throughout the experiment.*

The counterparts in Room A [*Room B*] will also have different, and unique, decision-maker numbers for each of the seven decisions. This is so that you will not know the identity of your counterpart in any given decision.

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[21] Although *ceteris paribus* it pays for a server to pay more attention to males than to females, note that the sensitivity of male (vs. female) tips to service quality is an important consideration here. For example, if males always tip 20%, and females tip 15% for good service and 10% for bad service, then it pays to give greater attention to females as a server.

You will be paid, in cash, for one out of seven decisions. Everyone, including the counterparts in Room A [*Room B*], will be paid for the same decision. The decision for which you and everyone else will be paid will be randomly determined at the end of the experiment: Once all of the decisions have been completed, we will ask everyone to complete a short questionnaire, which will be used for research purposes only. Then, everyone will be brought together into one of the two rooms. The monitor will then show everyone the contents of a bag, containing seven poker chips (one for each decision). The chips will be placed back in the bag and the monitor will then ask a volunteer subject to draw a chip from the bag. The chip drawn will correspond to the decision for which you, and everyone else, will get paid. Your best strategy is to take every decision seriously, as that decision might be the one for which you get paid.

Subjects will be dismissed one at a time for payment. When your **player number** is called, come to the counter at the entrance. You will be paid and then asked to fill out a receipt form. Once you have completed the receipt form, you are done with the experiment and may leave.

In order to keep track of your earnings in each decision, you will be given a **record-keeping sheet**. On it, you should write down the amount that you earn in each decision.

Finally, throughout the entire experiment, **YOU MUST REMAIN QUIET! Failure to do so will result in dismissal from the experiment and forfeiture of payment.**

ARE THERE ANY QUESTIONS?

Predecision Information—Room A

For each of the decisions in which you participate, you will have a counterpart from Room B. Right now, the two counterparts in Room B are completing a skill task. They will then be ranked into one of two groups, according to their performance on the skill task. The top performer on the skill task will be ranked into Group 1, while the bottom performer will be ranked into Group 2. For a given decision, your counterpart's ranking will determine an amount of money to be divided between you and the counterpart. A Group 1 ranking will always imply a higher division amount than a Group 2 ranking.

The counterparts will complete the skill task a total of seven times today, once before each decision. Thus, a given counterpart's ranking may, or may not, be the same in each decision.

Predecision Information—Room B

You will be given two minutes to complete a word search puzzle. Once the two minutes have expired, your word search will be scored according to the total number of words you found. The more words you find, the higher will be your score. You will then be ranked into one of two groups: Group 1 is the group with the higher score on the word search puzzle and Group 2 is the group with the lower score on the word search puzzle. In the event of a tie, another word search puzzle will be administered to break the tie.

The above word search puzzle process will be completed a total of seven times today, once before each decision. Thus, your ranking may, or may not, be the same in each decision. Your ranking in a given decision will determine an amount of money to be divided between you and several different counterparts in the adjacent room. A higher ranking (i.e., Group 1) implies a higher division amount.

Decision Red (One-Person Table Treatment)—Room A

For this decision, you will be asked to sit at one of the tables. You will be randomly matched with a counterpart in Room B. You will not know who this person is, and this person will not know who you are, either during or after your decision.

Your counterpart's ranking, as determined by his/her skill, determines an amount of money to be divided between the two of you:

Rank	Amount
Group 1	$28
Group 2	$14

The monitor in the adjacent room will record your counterpart's rank, your counterpart's decision-maker number for this decision, and the amount to be divided, as determined by your counterpart's skill, on a decision sheet. The monitor will then bring the sheet over to this room, where it will be distributed to you. Please make sure to put your **decision-maker number for decision RED** on the sheet where it asks you to (refer to the card given to you at the beginning of the experiment).

You must then indicate on the decision sheet how much money you wish to allocate to your counterpart, if any, and how much money you wish to keep for yourself. These values must exhaust the division amount shown on the

decision sheet. For example, if your counterpart earned a Group 1 rank, then an allocation to your counterpart of $x implies you keep ($28–$x) for yourself. The decision is totally up to you, and must be in increments of $.25. When you are done, please wait for the monitor to come by and collect your decision sheet. Finally, make sure to record your earnings for this decision on your record-keeping sheet.

The monitor will then take the decision sheet over to the adjacent room, where it will be shown to your counterpart.

An Example

Suppose your counterpart, whose decision-maker number for decision RED is 1001, earned a Group 1 rank. This implies an amount to be divided of $28. Suppose your decision-maker number for decision RED is 1002. Further, suppose you wish to allocate $5.75 to your counterpart and keep $22.25 for yourself. You will record these values as illustrated by the monitor, and then wait for the monitor to come by and collect the decision sheet. The decision sheet will then be brought over to Room B, for your counterpart to look at. In this example, you would earn $22.25 and your counterpart would earn $5.75. **This is only an example – the actual decision is totally up to you.**

ARE THERE ANY QUESTIONS?

Decision Red (One-Person Table Treatment)—Room B

For this decision, you will be randomly matched with a counterpart in Room A. You will not know who this person is, and this person will not know who you are, either during or after this decision.

Your ranking determines an amount of money to be divided between you and your counterpart. For this decision, the amounts are indicated below:

Rank	Amount
Group 1	$28
Group 2	$14

The monitor in this room will record your rank, your decision-maker number for this decision, and the amount to be divided, as determined by your ranking, on a decision sheet. The monitor will then bring the sheet over to Room A, where it will be randomly distributed to a counterpart.

Your counterpart must then indicate on the decision sheet how much money he/she wishes to allocate to you, if any, and how much money he/she wishes to keep for himself/herself. The decision is totally up to your counterpart, and must be in increments of $.25. When your counterpart is done, the monitor in Room A will come by and collect his/her decision sheet. The monitor will then bring the decision sheet over to this room, where it will be shown to you. The monitor will then walk by and collect the decision sheet. Finally, make sure to record your earnings for this decision on your record-keeping sheet.

An Example

Suppose you earned a Group 1 rank, and that your decision-maker number for decision RED is 1023. This implies an amount to be divided of $28 between you and your counterpart. The monitor in this room will record this information on a decision sheet as such, and then bring it over to Room A. Suppose your counterpart, who has a decision-maker number of 1024 for decision RED, wishes to allocate $5.75 to you and keep $22.25 for himself/herself. Your counterpart will record these values as illustrated by the monitor, and then wait for the monitor to come by and collect the decision sheet. The decision sheet will then be brought back over to this room for you to look at. In this example, you would earn $5.75. **This is only an example—the actual decision is totally up to your counterpart.**

NOTE: AS THERE ARE 12 PERSONS IN ROOM A, AND ONLY 2 HERE IN ROOM B, YOU WILL PARTICIPATE IN 6 DECISION REDS. FOR EACH, YOU WILL HAVE A DIFFERENT COUNTERPART.

ARE THERE ANY QUESTIONS?

Appendix B: Copy of Survey

THIS SHORT SURVEY IS FOR A Ph.D. DISSERTATION. THE INFORMATION YOU PROVIDE IS ANONYMOUS. THANK YOU FOR BOTH YOUR TIME AND COOPERATION.

1. How many people were at your table?_____
2. How many checks did your table have?_____
3. How many people, **including yourself**, did you pay for?_____
4. What was the total bill for the people, **including yourself**, who you paid for **(NOT INCLUDING TIP)**?_____

Are any of the people you paid for going to give you money toward this amount *(circle one)*? **Yes No**

5. How much money, **in dollars and cents**, did you tip the server?_____
   Of the people you paid for, did anyone **other than you** leave a tip *(circle one)*? **Yes No**
6. Was the tip automatically added to your bill? *(circle one)* **Yes No**
   If you answered yes, what was the percent tip automatically added?_____
7. How did you pay for your bill? *(circle your response)*
   Cash Credit card/ATM Card Check Other:_____
8. Did anyone at your table have:
   Appetizers? (includes soups, salads) *(circle your response)* **Yes No**
   Entrees? *(circle your response)* **Yes No**
   Desserts? *(circle your response)* **Yes No**
   Alcohol? *(circle your response)* **Yes No**
9. On a scale from 1 to 7, how would you rate the service you received from your waiter/waitress? *(circle your response)*

Poor						**Excellent**
1	**2**	**3**	**4**	**5**	**6**	**7**

10. What was your server's sex? **Male Female**
11. On a scale from 1 to 7, how would you rate the frequency with which you dine at this particular restaurant? *(circle your response)*

Least Frequent						**Most Frequent**
1	**2**	**3**	**4**	**5**	**6**	**7**

12. Have you ever been employed as a waiter or waitress? *(circle your response)* **Yes No**
13. For tax purposes, are you a dependent of your parents? *(circle your response)* **Yes No**
14. What is your sex? *(circle your response)* **Male Female**
15. What is your age?_____
16. What is your marital status? *(circle your response)*
    Single Married Divorced/Separated Widowed
17. Do you regularly attend religious services? *(circle your response)* **Yes No**
18. What was your family's (all of the people in your household) approximate total income last year? *(circle your response)*
    Less than $18,000
    $18,000–$33,000
    $33,000–$52,000
    $52,000–$82,000
    More than $82,000
19. What is the highest degree you have obtained?_____
    How many years of postsecondary (beyond high school) education have you completed?_____
20. What do you think the norm is regarding percent tip in a restaurant?_____
21. If you receive **terrible** service, what percent tip do you normally leave?_____
22. If you receive **outstanding** service, what percent tip do you normally leave?_____
23. If you receive **standard** service, what percent tip do you normally leave?_____

THANK YOU!! PLEASE FOLD AND PLACE IN BOX

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