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Asset Ownership, Investor Characteristics, and the Endowment Effect

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Abstract

We survey individuals regarding personal attributes and specific assets owned to identify characteristics associated with the endowment effect. Using eight separate models including multiple regression analysis and statistical modeling techniques including adjusted R-square, root-mean-square error (RMSE), Akaike's Information Criterion (AIC), forward selection, backward elimination, and stepwise regression methods, we find that individuals who gamble more, have less formal training in investments, who are male, are less optimistic, have held the asset in question for longer periods of time, have a component of their income as commission-based, and have a longer time period until retirement are more likely to exhibit a greater endowment effect bias.

Introduction

The endowment effect is based on the premise that investors place higher values on assets they own than on equally valued assets they do not own. This difference means individuals may "over value" assets they own relative to their true value. Stated differently, individuals will pay less for assets than they are willing to accept to give up the same assets in their possession. In the behavioral finance literature, these measures are called the willing to accept (WTA) and the willing to pay (WTP) values. The gap between the two values is evidence of the endowment effect.

The purpose of this study is to aggregate and examine the theoretical and empirical characteristics identified in previous research as associated with the endowment effect. This study adds to the understanding of the endowment effect in two ways. First, in contrast to much of the work in this area, we survey individuals on their perceptions of the worth of actual assets they own. The bulk of the empirical studies in the area use scenario experiments to examine the difference between subjects' WTAs and WTPs. Many, if not most, of the studies are performed in a classroom setting. Subjects are given scenarios in which participants indicate either buying or selling prices based on a provided story. Environmental scenarios are also used to evaluate subjects' buy and sell prices. For example, in a scenario study, Hammack and Brown (1974) examine the price one would pay to maintain a duck wetland compared to the price one would demand as compensation to allow the wetland's demise. The authors find a fourfold difference between the price a participant would accept to allow the demise of the wetlands compared to the price a participant would pay to save the wetlands. Alternatively, market experiments are conducted where participants are given something nominal, such as a mug, lottery ticket, or ink pen and are then allowed to trade with other study participants, following the guidelines of the experiment. The primary goal of many of these studies is to measure the difference between the WTA value and the WTP value for the object in question (see for example Knetsch and Sinden 1984; Coursey, Hovis, and Schulze 1987; and Jefferson and Taplin 2011).

Some evidence exists that suggests that participants in traditional studies, often college students in a classroom setting faced with a hypothetical scenario or a fabricated market situation, may attempt to "game" the experiment and may not actually be revealing the true prices at which they would buy or sell. For example, Knetsch and Sinden (1984) note that respondents may provide unreliable responses that do not reflect their actual behavior when confronted with a real situation. In addition, the objects in question are of little monetary value (e.g. a mug with the school name on it or a $2.00 lottery ticket). In this study, we survey individuals and ask them to identify a specific asset in their possession. Assets range from automobiles to stocks to jewelry. We then ask participants a series of questions aimed at identifying their proneness to the endowment effect. No issue of gamesmanship should exist since the asset is something the individual actually holds and values, not a "prize" in a college classroom experiment. Second, while various studies identify one to two factors that they show contribute to the endowment effect, such as gender or the relationship with the seller, we examine an exhaustive list of identified contributing factors in the literature simultaneously. This area of study is relevant both from a practical standpoint and from a theoretical one. The endowment effect has implications for investment decision-making (see for example Knetsch and Sinden 1984, Coursey, Hovis, and Schulze 1987 and Furche and Johnston 2006), legal and political policy (see for example Arlen and Tontrup 2014) and overall societal welfare (see for example Glockner, Tontrup and Bechtold 2015). Understanding the fundamental characteristics

of an individual that drive the endowment bias offers insights into much broader issues that affect society.

In this study, we explore eight models based on responses to survey questions aimed at assessing the endowment effect. We use multiple regression analysis and statistical modeling techniques including adjusted R-square, root-mean-square error (RMSE), Akaike's Information Criterion (AIC), forward selection, backward elimination, and stepwise regression methods to identify those characteristics most closely associated with the endowment effect. The survey was initially distributed to 1,000 individuals through social media outlets such as Facebook and via email. The survey was distributed to a mix of family, friends and coworkers of two of the study's authors. The final sample consists of 152 people who responded to the survey. Ages of survey participants range between 25 and 75 with an average age of 33 years. The participants were from varied educational and work backgrounds. By polling a wide array of individuals from many different backgrounds, education levels, and differing levels of financial experience and expertise, on assets that they explicitly own, we add to the existing literature helping to understand the impact of the endowment effect on investor decision making.

Literature Review

The endowment effect has its roots in Kahneman and Tversky's (1979) seminal work in behavioral finance on individuals' propensities toward loss avoidance, known as prospect theory. Prospect theory, also called loss aversion theory, indicates investors are more likely to take risks when faced with losses and exhibit higher levels of risk aversion when trying to protect gains. Investors willingly take risky bets to recoup past losses to avoid having to recognize an actual loss. In the context of the endowment effect, selling an asset is akin to a loss in prospect theory. Thaler (1980) is the first to label the behavior of overvaluing objects one owns as the *endowment effect.* The minimum an individual will accept to part with an object, the WTA, has also been used to measure the amount that an individual would accept to put up with a negative consequence (e.g. letting the wetlands be destroyed). In contrast, the maximum value for which an individual will pay to obtain an object, the WTP, is also used to measure the amount he would pay to avoid a negative consequence.

Arrow (1982) uses cognitive psychological models to explore investor rationality. Employing the expected-utility hypothesis, he explores investment decision making on the basis of rationality of choice. If investors are irrational in their investment decision making, then security prices no longer reflect an unbiased predictor of value. Deviations from a calculated price point corroborate the results obtained in psychological studies, indicating that investors do indeed rely on others' opinions to value their own assets. Arrow outlines additional concepts of irrational behavior as he illustrates framing and loss aversion. For example, while it would be a favorable bet (if not a sure thing) for individuals to purchase flood insurance (especially because it is partially subsidized and therefore by definition underpriced), most individuals actually avoid purchasing flood insurance. These individuals reject the "sure thing" of an underpriced asset (insurance coverage) due to framing. This finding suggests irrational behavior continues to exist in the marketplace in which individuals overvalue their own position (forgoing flood insurance) rather than protecting their home from potential disaster as well as taking the favorable position of purchasing an option or asset at a price below true market value. Kunreuther (1978) tried to uncover an explanation for this behavior consistent with economic theory, but could not. He

found a simple explanation for the behavior but one inconsistent with economic theory: people who bought flood insurance knew other people who had bought flood insurance.

Haltiwanger and Waldman (1985) build on Arrow's work exploring the differences between rational and naïve agents and the impact of the difference between them on investor behavior. Based on certain individual attributes such as rationality, optimism, education, awareness, and stability; they argue that individuals characterized by rational outlooks are labeled sophisticated, and those who have incorrect expectations and are irrational in their decision making are labeled naive. In more congested (synergistic) markets, sophisticated (naïve) investors have a stronger influence on market equilibrium. Thus, both rational and irrational behavior may drive a market based on the balance that exists.

Following the early work of Kahneman and Tversky (1979) and Thaler (1980), several studies have examined the theoretical and empirical characteristics associated with the endowment effect. Prior to these early studies that identified an endowment effect, the usual presumption was that the difference between the WTA and WTP values would be negligible and any small differences would result from income and wealth effects. Knetsch and Sinden (1984) examine the differences however and find wide variations in the WTA-WTP gap. The authors, noting the shortcomings of hypothetical scenario studies, devise four experiments that require participants to make actual cash payments and receive actual cash compensation. The study relies on students at the University of New England, and uses lottery tickets redeemable for cash or merchandise. The authors find that individuals will spend "opportunity" income more readily than actual income and that study participants' WTAs are significantly larger than their WTPs.

Expanding on Knetsch and Sinden, Coursey, Hovis, and Schulze (1987) examine the difference between the WTA and the WTP values, remedying two concerns they express regarding the Knetsch and Sinden experimental design. First, they suggest that Knetsch and Sinden introduce uncertainty into the experiment by changing the frame of the question from a choice to buy to a choice to sell. Coursey et al. propose this uncertainty will impact the difference between the WTA and WTP values. Second, the authors note that there is no opportunity for learning in the Knetsch and Sinden study. They argue that "one shot" experiments rarely result in behavior consistent with economic theory. As such, Coursey et al. construct an experimental design that they believe remedies the problems associated with the Knetsch and Sinden experiment. They use the Vickrey or competitive auction (Vickrey 1961, 1976) to obtain WTA and WTP values. In a Vickrey auction, the lowest bid wins but the winner receives payment based on the second lowest bid. The same is true for buying assets. The highest bid wins but the winner pays the second highest bid. The authors argue that because participants do not pay or receive what they actually bid, they have little incentive to make false or strategic bids (i.e. to game the system). Thus, the major benefit of the Vickrey auction is the ability to obtain true values while retaining the silent bid format, eliminating the influence of collaboration. Trial iterations are run so that participants can learn that revealing true values is the best strategy. By designing their study to included repeated runs, participants within the study gain experience to better understand both their peers (the marketplace) as well as develop strategies to better negotiate pricing. The authors find that while opening bids are close to the WTA-WTP gap observed in the Knetsch and Sinden study, after learning occurs, the disparity is reduced significantly. In the trials, the WTA-WTP disparity decreases, implying that in more established markets the true disparity between WTA and WTP should be closer than in emerging and nontraditional markets. As individuals better understand the markets for their assets and trading volume increases, markets become more efficient and the disparity is reduced or

eliminated. As a result, Coursey et al. submit that the WTA-WTP gap should be negligible in mature market settings. They also intimate that individuals with little market experience (i.e. little learning) may indeed exhibit large gaps between the WTA and WTP values.

Knetsch, Fang-Fang and Thaler (2001) also uses a Vickrey auction based on multiple rounds of a trial in which individuals are tested and then learn as a basis to better understand the endowment effect. In contrast to Coursey et al., Knetsch et al. find that not only does the buyer-seller disparity not converge, but that a consistent valuation of an asset is not produced. This inconsistent evidence, using a similar methodology, suggests that further research is necessary on the value of learning as it relates to the endowment effect.

In a later study, Furche and Johnston (2006) examine the endowment bias in trading activity on the Australian Stock Exchange and affirm the finding that sophisticated investors are less affected by the endowment effect than private client trading occurring through retail brokers. In other words, Furche and Johnston support the Coursey et al. conclusion that economic knowledge (i.e. learning) is relevant to the size of the WTA-WTP gap.

Knez, Smith and Williams (1985) and Knez and Smith (1987) argue that sellers not only overstate the true values of their assets, but are often rewarded for the overstatements. Buyers are also often rewarded for understating the bid prices of assets they intend to purchase. The authors indicate that the endowment effect may simply be the result of good bargaining habits. Sellers are more likely to sell at a higher price if they ask for a high price (relative to the true value of the asset) and buyers are more likely to pay a lower price if they offer a low price. The authors indicate that this overstating/understating behavior may persist even when there is no advantage to be gained (e.g. when answering hypothetical questions about WTP and WTA or when trading nominally priced goods like mugs or lottery tickets in an experimental setting). If this is the case, then the discrepancy between the WTA and WTP values is a strategic mistake and should disappear as participants "learn" in the market.

To further the understanding of the role learning and experience plays, Kahneman, Knetsch, and Thaler (1990) examine whether the endowment effect disappears when subjects have a chance to increase their economic knowledge. They construct a study using the real exchange of token goods such as mugs and chocolate bars. Some of the subjects receive the good and are thus sellers, and the remaining subjects are buyers. The null hypothesis, as suggested by economic theory (i.e. the Coase theorem), is that one half of the goods will be traded. The authors examine the question of whether a reluctance to buy or sell exists and find reluctance is present as the trading volume is significantly less than the 50 percent predicted by theory. The experiment included buyers, sellers, and "choosers." The choosers were not given a mug or money, but were instead asked to choose whether they would buy or sell mugs at a series of pre-determined prices. The choosers acted more like buyers than sellers, indicating that the endowment effect has more to do with sellers not wanting to give up their assets than with buyers not wanting to spend their cash. They also find evidence of what they label an "instant endowment effect." That is, when ownership is conveyed to a study participant, the subject immediately assigns a higher value to the item (e.g. mugs, pens, chocolate bars) and demands more to give up the item than he is willing to pay to acquire the item. Thus, an instant endowment effect exists because the (over)valuation of an asset/item is recognized at the exact time (and solely because) the asset/item is possessed by an individual. When a chance exists to receive something, versus actually being given the good, the endowment effect appears to be weaker. The authors indicate that experience in the market and/or knowledge of investing does not necessarily reduce the presence of the endowment effect. In addition, Gelman, Manczak, and

Noles (2012) study preschoolers and conclude that even at young ages (between 2 and 4.4 years), evidence of an endowment effect is not only present, but an almost instant endowment effect exists as well. Thus, children at very early ages assign higher values to their own possessions relative to the items' true values. Chaterrjee, Irmak, and Rose (2013) corroborate the instant endowment effect.

Kahneman, Knetsch, and Thaler (1990, p. 1344) note that "an endowment effect will almost certainly occur when owners are faced with an opportunity to sell an item purchased for use that is not easily replaceable." While this assessment draws upon the basics of selling behavior with respect to supply and demand (inflating the value of a scarce good), it puts forth the idea that increased value is created instantly and in direct correlation with the perceived value of an item. The perceived value is based primarily on ownership and the degree of difficulty replacing a good rather than on market value. Shogren, Shin, Hayes, and Kliebenstein (1994) support this argument. They suggest that the size of the endowment effect is influenced by the availability of substitutes for the good. With a greater institution of exchange (i.e. market), better substitutes should exist. Shogren et al. assert that additional options and repeated experience will produce a smaller endowment effect compared to the disparities that occur when a good is limited in supply, or with markets where trading or the exchange itself is limited. More recently, Nataf and Wallsten (2013) claim the endowment effect is significantly more powerful for non-traditional assets, especially those assets which are not easily monetized in traditional markets. Furthermore, investors are more likely to exhibit a stronger endowment effect when a stated value (e.g., a house) is not assigned using a traditional market price.

In a journal column on economic anomalies, Kahneman, Knetsch and Thaler (1991) discuss some of the prevailing literature regarding loss aversion and the endowment effect and relate the two theories to the status quo bias. They argue that an implication of loss aversion is the tendency of people to retain their assets. They use as an example a friend who is a wine collector. The value of a particular Bordeaux the person purchased years ago at a reasonable price increased to $200 per bottle. While the owner will occasionally drink a bottle of the wine, he is neither willing to buy or sell the wine at the current market price. The authors argue this is an example of status quo bias, proposed by Samuelson and Zeckhauser (1988). In a hypothetical scenario study involving the inheritance of a portfolio of financial assets, subjects were much more likely to choose a status quo option (e.g. leave the portfolio invested as the bequeathing uncle had) when provided, compared to changing the investment strategy. In the final sentences, the authors conclude that loss aversion, the endowment effect and status quo bias are real and important. They then jokingly indicate that these theories are part of their endowment, and thus they are more inclined to retain the theories than others, not endowed, who may be less inclined to adopt them.

Building on Kahneman and Tversky's early work on loss aversion, Boyce, Brown, McClelland, Peterson and Schulze (1992) investigate the relationship between investment choice and individual morality by testing subjects based on an environmental experiment. WTA is introduced as a strong welfare measure, but in a different context than previous studies. While their work is among the first to use the concept of framing, the endowment effect with respect to morality is tested in a way that the subject is faced with a moral and perhaps even emotional decision rather than just a change of financial position. While investors often select among options on the basis of how each option choice is framed, they present the options in a way in which the individual is choosing the life of a tree and the negative consequences which accompany that choice instead of a change in price for a good. In this scenario, the WTA is the

amount the individual would accept in order to part with the object, but the decision has negative consequences as well. By parting with the tree for the agreed upon amount, the individual knows the tree with which they have parted will be destroyed. The WTP represents the maximum value that an individual would pay to obtain an item as well as the amount that he would pay to avoid a negative consequence (paying to save the tree from being destroyed).

Shefrin (1999) builds on previous research arguing that investor behavior can be described by three broad themes. The first theme is that investors make decisions based on their personal experiences (heuristics). This paradigm can easily be accompanied by a cognitive bias in which decision making strongly relies on more recent information, negative information, or information frequency. Second, based on work by Boyce et al. (1992), Shefrin argues investors process or "frame" information that can significantly influence decision making. Framing leads investors to hang on to their poor performers for far too long to avoid losses while shedding off superior performers too quickly in an attempt to recognize gains. Finally, the third theme argues that truly inefficient markets are the result of the combination of heuristic biases and frame dependence as stated in the first two arguments.

Jefferson and Taplin (2011) argue that based on the endowment effect individuals are likely to overvalue objects they already possess. They explore the level of endowment based on the asset's uniqueness and the manner in which it was acquired. Using a factorial survey design framework, they find higher levels of the endowment effect for possessions that have been gifted from a close friend. The effect is differentiated by gender: women tend to possess higher levels of the endowment effect than men. According to the authors, women tend to place higher value on relationships and thus assets given to them by close friends receive higher values relative to the values men place on the same, friend-endowed items.

Morewedge, Shu, Gilbert, and Wilson (2009) put a different spin on the reasons underlying the endowment effect. The authors argue that from a psychological point of view investors are less likely to give up a possession that they own, not because they do not want to realize the loss, as the prevailing literature on the endowment effect suggests, but instead because they associate that good with themselves (and do not want to give up a piece of themselves). This work was the precursor that caused researchers to question the traditional view of the endowment effect, that it was the result of loss aversion, and consider an alternative explanation termed the "ownership view." This view postulates that it is the relationship between the good and the sense of self that it brings that makes sellers reluctant to sell, and in turn price assets at above market values. Svirsky (2014) does not find support for the endowment effect for exchange goods, such as money. The author examines three goods that represent tokens: money, chocolate coins, and chocolate coins that represent tokens. He finds an endowment effect when the good traded is chocolate, but no endowment effect for money or money-like chocolate (i.e. chocolate coins that represent a token rather actual chocolate). This finding is interesting in the context of the ownership view of the endowment theory. It would seem individuals might more readily identify themselves with their home or their car, than with exchange goods such as cash.

In addition to corroborating the instant endowment effect, Chaterrjee et al. (2013) also explore the ownership explanation of the endowment effect proposed by Morewedge et al. (2009). Chaterrjee et al. argue that the endowment effect is connected to the psychological association of the object with the individual. According to the authors, an individual values an item primarily because of the item's association with the owner, not just its market value. They also examine subjects' WTP and WTA values when the subject feels threatened with the loss of the item. Sellers responded to "threat" words, like "endanger" with higher selling prices

compared to buying prices. The authors suggest that sellers may feel threatened even when selling mundane items and buyers can make them feel less threatened (and ultimately achieve a lower purchase price) by affirming and flattering sellers. In other words, lessening the feelings of threat a seller feels may shrink the endowment effect.

Furthering the work of Morewedge et al., Dommer and Swaminathan (2013) examine three additional variables which theory would suggest affects the possession-self link and therefore the endowment effect: gender, identity associations of a good, and social self-threat. The authors argue that the traditional theory of loss aversion does not fully explain the endowment effect and that an ownership account, posited by Morewidge et al., may be more relevant. They rely on the psychology literature to support the notion that possessions enhance one's sense of self. They also argue that a threat to one's social standing will impact one's WTA value. However, the authors posit that appreciating gender differences can further our understanding of this effect. For example, women are more communal in their orientation while men are more individualistic (see for example Bakkan 1966; and Carlson 1971). This means that women in general prefer individuals in their group to those outside of it. The argument Dommer and Swiminathan make is that individuals who are faced with social self-threat (i.e., those who believe their self-concept is being or has been threatened or suffer from a lack of confidence), tend to have a stronger endowment effect. If they perceive goods as having a stronger link with themselves as well as having those goods become essentially a part of their own image, then the endowment effect will be greater. The authors use three moderators – social self-threat, social identity and gender – to better understand the endowment effect. They perform their experiment in a university setting, again using students as subjects. The authors employ a "social self-threat manipulation," having students think about and write about an instance where they felt rejected and unloved. They then have participants engage in the typical exercise of buying and selling a nominal object, in this case a ball point pen. They find that social identity affects selling prices more than buying prices. This finding is in contrast to the prediction of loss aversion theory, which implies that social identity affects buyers and sellers the same and thus should have no impact on the WTA-WTP gap. After a social self-threat, an increased endowment effect is observed for both men and woman. The endowment effect is eliminated for men but not women if the individual is unaffected by the threat. The authors do argue however men may be more tied to an in-group affiliation than women, for example, to a sports team, and that additional work needs to be done to examine gender differences.

Bauer and Schmidt (2012) also explore the effect of gender and educational differences on the levels of endowment bias using a sample of students. The authors find that students studying economics display a lower endowment effect than similar students and peers who have concentrations in areas other than economics and business. Results of this study also indicate that women actually exhibit a significantly higher endowment effect than men in a similar environment. Their results also suggest that the market price of an object can have a major bearing on the level of endowment experienced as well. The endowment effect may also be influenced by both the individual's level of wealth and the intended use of the asset. Whether the asset is viewed exclusively as a possession or as an investment intended to be a source of future income can greatly influence the size of the endowment bias exhibited. Bauer and Schmidt establish that the endowment effect can be greatly influenced by the size and value of a specific item or asset. Thus, an item with a high initial value or investment cost can be considered an investment rather than simply as a high value item (e.g., a house or a portfolio). Such objects of high value or importance which also have a greater financial worth should also have a higher

endowment effect associated with them. Because the item has a greater opportunity cost to acquire initially, it represents a significant investment to replace, proportionate to the asset owner's net worth. . Furthermore, if the object is viewed primarily as an investment vehicle, the asset holder should show much greater loss aversion tendencies. Conversely, if the item in question had a lower acquisition cost, the item is more likely to be valued with a smaller endowment effect. The reverse relationship can also occur in which an object has a higher personal and sentimental value than the assessed and replacement values. This scenario illustrates that it is much easier to replace the physical object itself than it is to replace the sentimental portion of the object. Examples of assets for which investors may have sentimental attachment include a pocket watch from a deceased family member or a jersey worn by a sports hero. Finally, because the endowment effect is essentially a biased valuation of goods, potential demographic traits may explain significant discrepancies in the overall valuation of assets.

The role of gender differences and risk aversion as it relates to the endowment effect are also examined by Wieland, Sundali, Kemmelmeier, and Sarin (2014). The authors find that women appear more risk averse than men when having to pay for an item but show no more risk aversion than men when accepting a payment for an item. In other words, men are willing to pay more for an item of uncertain value (i.e. a gamble) and are thus less risk averse than women. The authors argue that this willingness to take risk may be a function of societal norms and that men have historically had to take risks to gain power. However, women will not accept less than a man for an item, even if it has an uncertain value. In contrast, the authors find no gender difference in the WTP when the item has a certain value, such as a Macy's gift card, implying the differences discovered in the study are a function of risk aversion differences and not general differences in the prices at which men and women are willing to pay and accept for assets. In addition to education, gender, field of study and feelings that the asset engenders in the owner about one's sense of self, individuals who display differing levels of rationality, stability, and optimism may also exhibit differing levels of the endowment effect. One might expect, based on the literature, both pessimism as well as extreme levels of optimism could result in an overvaluation of an item. The similarity of these concepts emerges from a fear of needing to recoup losses (pessimism), or an overconfidence of being able to "beat the market" (optimism). Frederick (2012) argues that some of the reasons for the inflated WTA and the over-valuation of an item may actually come from underestimating others and their ability to "exert self-control." If this underestimation of others holds true, then it is essentially overconfidence in oneself when compared to the abilities of others that may contribute to the endowment effect. Bertella, Pires, Feng, and Stanley (2014) conclude much of the behavior of individual agents within a market cannot be explained by individual risk and overconfidence bias when it comes to the efficient market hypothesis.

Martinez, Zeelenberg, and Rijsman (2011) introduce regret into the endowment effect puzzle and show that inducing regret can actually eliminate the classic endowment effect. However, while the provoked feelings of regret eliminate the endowment effect, the authors find that an induction of disappointment reinstates it. The argument presented is that decision making must be explored with respect to the nature of human emotion, especially at the time the decision is made. Glockner, Tontrup, and Bechtold (2015) find that the endowment effect is significantly reduced when there are strategic reasons to overprice an asset or right, as in the case of anticommons. An anticommons property is one in which one or more parties have exclusive rights to a scarce resource and prevent others from using it, hindering the greater good. Anticommons reduce the number of successful transactions and may ultimately lead to market

breakdowns. Glockner et al. find that mispricing in anticommons is only marginally related to an endowment effect and is explained by incentives to misprice and by the interdependence of outcomes. From a policy perspective, the authors argue that government intervention in anticommons matters may reduce the incentives to overprice but may reflate the endowment effect, the end result being similar to that without regulation. Arlen and Tontrup (2015) also suggest that the endowment effect rarely justifies legal intervention. The authors argue that while the endowment effect is caused by anticipated regret, if individuals can share responsibility for a decision, by transacting through institutions that allow for the sharing of responsibility, regret is diminished. They suggest that since most market participants trade through institutions, most people will make unbiased trading decisions in real markets, and not falsely constructed markets as in much of the endowment effect literature.

In this paper, we take a different approach to the examination of the endowment effect, obtaining survey results from more than 150 people on assets they actually own, rather than assets they must imagine owning. We do not provide study participants with a made up scenario, nor do we ask them to trade a nominally valued item in a classroom or laboratory setting. Instead we ask survey respondents to identify an actual asset they own and then ask participants a series of questions, drawn from the literature, intended to ascertain whether there is an endowment effect. Assuming an endowment effect exists, we seek to identify personal attributes that are most closely associated with the effect. We use eight separate models including multiple regression analysis and statistical modeling techniques including adjusted R-square, root-mean-square error (RMSE), Akaike's Information Criterion (AIC), forward selection, backward elimination, and stepwise regression methods to identify characteristics associated with the endowment effect.

Sample

The appendix contains the survey used to gauge and measure the endowment effect in individuals. Survey participants were asked to identify an asset that had been acquired with the intent of realizing a future financial payoff or an item that bore significance only in the mind of the holder. The asset had to be tangible and possess a measurable value in the marketplace. For purposes of measuring the endowment effect, a series of statements were crafted based on previous research. A five-point, Likert scale was used for the purposes of assessing the degree of endowment effect. This study does not include a manufactured scenario or trading of a nominally valued item but instead is based on the respondent's assessment of an asset he or she actually owns.

This survey was initially distributed to 1,000 individuals, an amalgamation of friends, family and coworkers of two of the study's authors through social media outlets (Facebook) and via email. The final sample consists of 152 individuals who responded to the survey request, representing a 15.2 percent response rate. The average age of the survey participant was 33 with an age range between 25 and 75. Twenty-eight percent of those surveyed selected a financial asset, 29 percent selected an automobile, 38 percent chose real estate, with the remaining 5 percent not identifying the specific nature of the asset selected. The identified asset had, on average, been held for slightly less than 8 years with a significant number of participants planning to part with the asset in 1-5 years (35.57 percent).

The average GPA of those participating in the study was 3.38 in their terminal degree program. Retirement averaged 30.63 years away with a range of 0 (three individuals were

already retired) to 45 years. Eighty-nine participants were male (59.33 percent) and 61 were female (40.67 percent). Twenty-four (24) occupational choices were offered with business and financial operations topping the list with 27 participants (17.88 percent), followed by education, training, and library (23 participants, 15.23 percent), and management (21 participants, 13.91 percent). Sixty-five participants (43.92 percent) had a bachelor's degree, with 54 (36.49 percent) possessing a graduate degree. Eighteen participants had earned an associate's degree (12.16 percent). A high school diploma was the terminal degree for 11 participants (7.43 percent).

The greatest concentration of respondents indicated some familiarity but no experience with investments, portfolio management, or asset valuation (46.31 percent), which corresponded identically to their self-assessment of knowledge. In addition, 60.93 percent had no formal training in investments nor did the majority of their friends have significant investment experience (64.24 percent). Approximately half (50.67 percent) of the sample were homeowners. Approximately half (50.34 percent) of the participants said they seldom play the lottery. Finally, approximately 47 percent of respondents self-reported that they occasionally drive above the speed limit.

For the purposes of measuring the endowment effect, we construct a survey with eight statements meant to capture evidence of an endowment effect. We rely on the literature discussed above to identify relevant relationships. In order to obscure the intent of the research, we rotate the directionality of responses. Survey questions are presented in Table I. The dependent variable name associated with each statement is shown in parenthesis after the statement. The second column identifies the nature of the theoretical relationship. Relationships identified as direct (indirect) indicate that higher agreement shows a greater (lesser) association with the endowment effect. The justification for each statement appears in the last column.

Table I Survey Questions

Table I shows the statements used to measure the endowment effect, their direction of the hypothesized relationship, and the justification for the measure.

Statement (Name assigned to the dependent variable)	Relationship	Justification
My chosen asset is worth more than the estimated market value of my asset (Worth).	Direct	Definition
If I lost my asset and was given the opportunity to replace my asset with a similar asset of equal market appraised value, the replacement would be just as valuable to me (Replacement).	Inverse	Knetsch (1989)
I would be willing to pay a fee to avoid a situation where my asset would be swapped for a similar asset of equal market appraised value. For example, swap a house for a house with the same market value (FeePaySwap).	Direct	Kahneman et al. (1991)
If I acquired an additional asset which was similar to and of equal market value with respect to the market value of my original asset, both of the assets would be of equal value in my mind. (EquivalentAsset)	Inverse	Disparity between WTA and WTP measures of value
If I then had the original asset taken from me, and was given compensation equal to the price I paid to acquire the second asset, it would be fair. (EquivalentCash)	Inverse	Disparity between WTA and WTP measures of value
If I knew the person (seller) who was the owner of a similar asset which I was to acquire with an equal market value to my current asset, I would consider that asset of equal (identical) value (KnowSell)	Inverse	Jefferson and Taplin (2011)
I would be able to sell my asset above the stated market price that it is supposedly worth without much trouble (AboveValue)	Direct	Haltiwanger and Waldman (1985)
If I were to purchase a similar asset with the same market value as that of my current asset, I would be willing to pay the price that I would sell my asset for under separate conditions. (PayAsset)	Inverse	Nataf and Wallsten (2013)

Table II shows the correlation coefficients between each statement indicating statistically significant correlations between pairings consistent with their hypothesized relationships. As one objective of this study is to aggregate previous research findings into our methodological design, Table II provides evidence that consistencies exist between hypothesized relationships in previous studies and responses from survey participants in our study.

Table II. Correlation Matrix

This table shows the correlation coefficients between statements used to identify characteristics associated with the endowment effect.

Variable Correlation Level of significance	Worth	Replacement	FeePay Swap	Equivalent Asset	Equivalent Cash	Know Seller	Above Value	Pay Asset
Worth	1.00							
Replacement	-0.26*** 0.0016	1.00						
FeePay Swap	0.24*** 0.0030	-0.46 <0.0001	1.00					
Equivalent Asset	-0.18** 0.0338	0.51*** <0.0001	-0.50*** <0.0001	1.00				
Equivalent Cash	-0.24*** 0.0040	0.28*** 0.0005	-0.27*** 0.0008	0.35*** <0.0001	1.00			
Know Seller	0.06 0.4567	0.32*** <0.0001	-0.33*** <0.0001	0.50*** <0.0001	0.40*** <0.0001	1.00		
Above Value	0.38*** <0.0001	-0.20*** 0.0163	0.19*** 0.0226	-0.03 0.7418	-0.07 0.3825	0.02 0.8137	1.00	
Pay Asset	-0.03 0.7159	0.22*** 0.0061	-0.23*** 0.0042	0.36*** <0.0001	0.17** 0.0413	0.39*** <0.0001	-0.04 0.6245	1.00

Model Development

In order to identify characteristics as possible contributors to the endowment effect, we rely on previous theoretical and empirical research to identify hypothesized variables that may be positively or negatively related to the endowment effect. In addition, we include additional control variables. Table III summarizes justification for the variables included in our models based on previous research detailed in our literature review including their arguments and findings and the related variables included in our study for investigation. In addition, specific questions used in the survey tagged to input variables in our model based on previous research appear in the Appendix.

Table III. Variable Justification

Table III shows the basis for included independent variables and control variables including a summary of the argument for their inclusion, the findings of the original study from which they are drawn, and the direction of the predicted relationship.

Study	Argument	Findings	Related variables included in our study	Direction of Relationship
Bauer and Schmidt (2012)	Individuals with a better understanding of the market tend to display a smaller endowment effect. The WTP-WTA spread is not impacted by the "emotional distance" occurring between the receiver and the giver.	Variables including familiarity and experience with investments and homeownership have the potential to expand the heuristic experiences of individuals. Education and experience influence endowment effect.	Familiarity with investing (FamiliarInvesting) Level of investment knowledge (Levelof InvestmentKnowledge) Formal training (FormalTrain) The manner in which the asset is acquired (AcquireAsset) Home ownership (Homeownership) Educational level (Education)	Lower Lower Lower Higher if acquired from friend/ family Lower Lower
Dommer and Swiminatha n (2013)	A level of "social self-threat" exists in certain individuals, who are seeking identity association. These drivers include self-threat, identity associations of a good, and gender. Also, the authors suggest a stronger endowment	Gender/identification variables as well as personality characteristics impact the endowment effect.	Gender (Gender) Height (Height)	Higher for women Higher for shorter person Lower

	effect for individuals who are less confident. This implies it will be lower for more confident individuals.	The lower the individual's self-esteem, the higher the endowment effect.	Propensity to socialize outside the home (GoingOut) Level of extraversion (Extraverted) Level of optimism (Optimism) Propensity to assume good things will happen (GoodThings) Confidence level in task completion (ConfidenceCompletion)	Lower Lower for higher levels of optimism Lower for expectation of good things Lower for greater confidence
Coursey et al. (1987)	Age of the individual and length of time owning the investment are parallel predictors of the endowment effect.	With age, investors have the potential to develop a greater understanding of the asset(s) they hold. The length of time participating in the market is an indicator of the familiarity and experience of a market	Length of time the asset is owned (LengthOwned) Age (Age)	Lower for longer time Lower
Arrow (1982)	Irrationality, risk tolerance and risk perception impacts the endowment effect	Notion of the company and colleagues one associates as well as the irrational behavior of individuals in financial decision making.	Gamble (Gamble) Self-reported abuse of driving laws (Driver)	Higher Higher

Sevdalis, Harvey, and Bell (2009)	Affective equilibra discrepancies that exists between owners and buyers may serve to explain the endowment effect	Risk perceptions should be incorporated into the analyses of financial behaviors triggered by the possible endowment effects associated with transactions	Academic performance (GPA) Time until retirement (TimeRetire)	Control Higher
Bibby and Ferguson (2011)	Those who display alexithymia (those unable to identify or describe emotions of the self) display a decreased endowment effect	Loss of sensitivity is associated with being less loss averse, but it also remains intact when risk seeking and risk taking behaviors are introduced and tested	Location on the political spectrum (Political)	Control
Jefferson and Taplin (2011)	Endowment effect is really made up of four subcomponents: (1) the source of the item (how it was obtained), (2) the presence of duplicates (exclusivity of the item), (3) the value of the item, and (4) the value of the trader/source to the individual	The perception of the investor affects the endowment effect by seeing both how and why the item was acquired.	Whether friends are investors (FriendsInvest) Net worth of peer group (PeerGroup) Nature of work compensation (WageMethod) Length of time before the asset under consideration is to be sold (WhenSell)	Control Control Control Control

Methodology

Multiple linear regression is used as a basis for identifying the primary drivers for the endowment effect. We use a variety of statistical techniques to arrive at optimal "best fit" models to describe investor behavior. Model diagnostics such as the minimizing root mean square error (RMSE) and maximize the adjusted coefficient of determination (Adjusted R Square), although these metrics are incomplete in assessing optimal models. The Akaike Information Criteria (AIC) (Akaike, 1973) provides a goodness of fit measure allowing for the measurement of a selected model and the "true" underlying model. AIC is calculated as shown in Equation 1:

$$AIC = n * \ln\left|\frac{SSE}{n}\right| + 2p \quad (1)$$

where n is the number of observations, SSE is the sum of square errors, and p is the number of parameters. The AIC measure is often referred to as an information criteria measure as it does not provide a test of a model in a statistical sense. Instead, AIC estimates the quality of each model, relative to other models. Thus, AIC serves as a basis for model selection. Much like RMSE, lower values of AIC indicate a better model "fit."

Next, we employ a number of heuristic measures. Beginning only with the intercept term, forward selection adds the independent variable that has the smallest p-value below our initially specified 0.15 level to the model and the F statistic for each remaining independent variable is recalculated. Variables continue to be added based on the lowest p value with recalculated F statistics until no remaining variables have p-values below 0.15. Once a variable is added to the model, it remains.

Backward elimination works in an opposite manner, originally including all variables with calculations of each's F statistic. With backward elimination, the variable with the largest p-value (above 0.15) is removed, F-statistics are recalculated, and the process continues until no remaining variables have p-values based on their F statistic that is above 0.15. Once a variable is removed from the model, it cannot be added back.

Stepwise regression is similar to forward selection with the exception that variables are not guaranteed to remain in the model after inclusion. With stepwise regression, included variables are re-evaluated with the inclusion of added variables and any variable in the revised model with p values above 0.15 is removed.

Results

Table IV shows the results from the adjusted R-square method. The fee pay swap model produces the highest adjusted R-square of all endowment models at 0.21. This model would indicate that the endowment effect is higher for those with less formal training in investments, for men, for individuals who are shorter, and who are less optimistic. Individuals who have held the asset in question for longer periods of time, who are younger, who gamble more, and who self-report violating speeding laws, who have friends and peer groups who invest also are more likely to be impacted by the endowment effect.

The model with the lowest RMSE and lowest AIC score is the pay asset model. Thus, this model provides the best fit to the "true" underlying model arguing that the endowment effect is most closely associated with individuals with less familiarity with investment knowledge, but greater formal training in investments, who do not own their own homes, have less education and are male, tend to own the asset for a shorter time period, and who gamble more. Removing those variables that do not overlap between these two methods and those variables at odds between the

two models, only gender (men) and those who gamble more seem to offer consistent explanatory power across these two models. This result is interesting in that studies in this area that include gender (e.g. Dommer and Swiminathan 2013; Jefferson and Taplin 2011), indicate that women are more likely to exhibit a higher endowment effect. However, these studies are conducted in a lab setting. Some studies indicate that women are more likely to conjure emotional feelings in scenario situations, possibly contributing to their higher WTAs compared to WTPs. But perhaps men are more attached to their actual assets than women. For example, a man may be more attached to a sports car or a sports team. In this study, we examine the attachment to actual high valued assets, not manufactured or nominally valued items. This difference may account for the reversal in gender results. An entire literature is devoted to possession attachment. While studies do not expressly relate possession attachment to the endowment effect, they do examine factors that affect attachment, such as age and gender (see for example Kleine and Baker 2004). Not surprisingly, men are attached to different types of assets than are women. Also, the reason for attachment is different between men and women. Consistent with the notion that women are more communal and men more autonomous, possessions are autonomy seeking for men and affiliation seeking for women. In this study, men often identified an automobile or something such as an Xbox 360 (a high-end video gaming system) as their asset. In other words, they were identifying assets that are linked to their identity.

Table IV. Adjusted R-Square, RMSE, and AIC Method

Table IV shows the results from the adjusted R-square, RMSE, and AIC models. Data shown within a row indicates that the independent variables contributing the best overall model in terms of adjusted R-square. The columns represent the results from each dependent variable assigned to measure the endowment effect. Shaded columns represent dependent variables where the statements used to measure the endowment effect were worded such that higher values of the variable were inversely related to the endowment effect.

Variable (pr<|t|)	Worth	Replacement	FeePay Swap	Equivalent Asset	Equivalent Cash	Know Seller	Above Value	Pay Asset
Intercept	3.32	4.61	3.11	3.80		1.77	3.81	3.84
Knowledge Investing	-0.29							-0.32
Level of Investment Knowledge	0.31			-0.23	-0.20	-0.26	0.29	
Formal Training			-0.22	0.21	0.27	0.27	-0.12	0.28
Acquire Asset								
Homeowner				-0.60				-0.40
Education		-0.34						0.14
Gender			-0.56	0.39				0.32
Height	-0.09		-0.17					
Going Out			-0.14	0.12				
Extraverted	0.15		0.29			0.13		
Optimism	-0.56		-0.25				-0.26	
Good Things	0.28						0.35	
Confidence Completion					0.45			
Length Owned	0.11	-0.41	0.13			0.19		0.10
Age			-0.30	-0.41				
Gamble		-0.32	0.23		-0.18	-0.33		-0.49
Driver			0.51	-0.41		0.30	-0.33	
GPA							-0.19	
Time Retire	-0.17	0.37		0.41				
Political	0.14					-0.14		
Friends Invest			0.28			-0.31		
Peer Group	0.16		0.19			0.17		

Wage Method				0.69	0.66464	0.67		
When Sell		0.07						
RMSE	1.31500	1.46558	1.26305	1.40933	1.43628	1.29171	1.40384	1.19328
Adj R-Square	0.10874	0.17454	0.20580	0.096900	0.0637	0.096548	0.039846	0.10364
AIC	73.4195	94.5214	65.9173	89.1450	90.8583	69.8268	84.1161	48.3507
SSE	179.838	236.272	162.721	210.538	228.92707	175.193	210.872	152.360

Because of their identical results, the results for the forward selection and stepwise regression models are combined into a single table in Tables V. Forward selection and stepwise regression are two different heuristic-based approaches to variable selection associated with explaining the endowment effect by adding variables to the model in order of their statistical explanatory power until all variables meeting the minimum criteria of adding acceptable incremental value have been exhausted. Differences between the two frameworks are based on whether a variable, once added, remains in the model with the inclusions of additional explanatory variables. With forward selection, once added, variables are retained; with stepwise regression, variables are not guaranteed to remain based on the relationships with additionally added variables.

Seven of the eight measures of the endowment effect show statistically significant models. From these methods, three variables stand out as consistently being associated and in a consistent manner with the endowment effect across the models: individuals holding assets for a longer time period exhibit more characteristics associated with the endowment effect (replacement, fee pay swap, and equivalent asset models). This result is inconsistent with our hypothesis. We predicted that holding an asset longer would increase the holder's familiarity with the asset, decreasing the endowment effect. However, one might argue that the longer one holds an asset, the more attached he becomes to it. Some evidence exists supporting our finding related to long-term product attachment. One study looks at furniture and finds that people who have had their furniture longer are more attached to it. This could be a possible explanation for the positive relationship between holding an asset longer and a positive endowment effect (Ko, Ramirez and Ward 2011). Also, as suggested by Morewedge et al. (2009), Chaterrjee et al. (2013), and Dommer and Swaminathan (2013), the endowment effect is connected to the psychological association of the object with the individual. One would expect that the longer one holds an asset, the greater the association of the asset with one's self. Take a house for example, the longer one lives in a home, the more closely one associates the home with one's self. In addition, those with less formal training in investments and those with commission-based or variable wages, and those who have longer time periods until retirement show statistically significant coefficients across the three models. These findings are consistent with the hypothesized relationships. Less formal training and a longer time period before retirement imply a person who is potentially less familiar with asset markets and thus have "learned" less. This finding is consistent with the work of Kahneman, Knetsch, and Thaler (1990) who argue that the endowment effect dissipates as participants become more familiar with asset markets. The nature of the individual's wages is a control variable and thus did not have a hypothesized relationship to the endowment bias. However, one might hypothesize that a person with less certain income might more highly value the assets in their actual possession than one with more certain income. The asset would have been obtained with earnings generated largely by the talents of the individual, possibly increasing the self-link between the individual and the asset.

Table V. Forward Selection and Stepwise Regression Models

Table V shows the results from the forward selection and stepwise regression models. Data shown within a row indicates the values of coefficients associated with independent variables with p-values less than 0.15 associated with each variable in parentheses. The columns represent the results from each dependent variable assigned to measure the endowment effect. Shaded columns represent dependent variables where the statements used to measure the endowment effect were worded such that higher values of the variable were inversely related to the endowment effect.

Variable (pr<|t|)	Worth	Replacement	FeePay Swap	Equivalent Asset	Equivalent Cash	Know Seller	Above Value	Pay Asset
Intercept	3.56 (<0.0001)	4.78 (<0.0001)	0.95 (0.2219)	3.30 (<0.0001)	-0.24 (0.8462)	2.38 (0.0003)	3.78 (<0.0001)	4.95 (<0.0001)
Knowledge Investing								-0.31 (0.1141)
Level of Investment Knowledge								
Formal Training			-0.18** (0.0441)		0.18** (0.0444)			0.25*** (0.0094)
Acquire Asset								
Homeowner								-0.49* (0.0372)
Education		-0.33* (0.0524)						
Gender								
Height						-0.10 (0.1273)		
Going Out								
Extravert ed	0.20* (0.0473)		0.25** (0.0111)					
Optimism	-0.42***		-0.23*					

	(0.0009)		(0.0535)					
Good Things								
Confidence Completion					0.37 (0.1464)			
Length Owned		-0.39*** (0.0002)	0.17* (0.0535)	-0.15 (0.1207)				
Age								
Gamble		-0.32 (0.1107)						-0.41** (0.0117)
Driver			0.55*** (0.0009)	-0.40** (0.0268)			-0.28 (0.1205)	
GPA								
Time Retire		0.37*** (0.0016)	-0.23** (0.0192)	0.25 (0.0235)**				
Political	0.20 (0.1162)							
Friends Invest			0.21 (0.1410)					
Peer Group			0.24** (0.0201)			0.19* (0.0579)		
Wage Method				0.51* (0.0738)	0.65** (0.0212)	0.65** (0.0135)		
When Sell								
F value	4.54*** (0.0049)	7.06*** (<0.0001)	4.41*** (0.0001)	2.88** (0.0257)	3.49** (0.0182)	3.33** (0.0223)	2.45 (0.1205)	3.82*** (0.0061)
R square	0.1092	0.2028	0.2496	0.0942	0.0854	0.0818	0.0214	0.1218
Adjusted R square	0.0851	0.1740	0.1930	0.0615	0.0609	0.0572	0.0126	0.0899

*-Indicates the coefficient/model is statistically significant at the ten percent level.
**-Indicates the coefficient/model is statistically significant at the five percent level.
***-Indicates the coefficient/model is statistically significant at the one percent level.

All eight measures of the endowment effect produce statistically significant backward elimination regression models as shown in Table VI. Backward elimination provides an alternative framework to heuristic statistical measures in that originally all survey variables are included in the model, with a sequential elimination of variables lacking statistical explanatory power. The process continues until the only remaining variables are those which continue to have explanatory power. From these methods, four variables stand out as consistently being associated and in a consistent manner with the endowment effect across the models. Individuals who gamble more (4 models), who are less optimistic (3 models), who tend to have wages that contain a commission-based component (3 models), and with a longer time until retirement (2 models) exhibit stronger characteristics associated with the endowment effect. These results are consistent with expectations. One would expect someone far from retirement to place a higher value on their own possessions. Also, there would have been less "learning" for those market participants who have been in the workforce for a shorter period of time. Also, one with less certain income might be inclined to value actual possessions higher than true values. It was hypothesized that pessimism would be positively related to the endowment effect as a proxy for recouping loss.

Any number of variables seems to have an influence on the degree of endowment effect exhibited by individuals. However, those characteristics most consistently and repeatedly appearing across multiple evaluation methods include individuals who gamble more, have less formal training in investments, are male, are less optimistic, have held the asset in question for longer periods of time, have a component of their income as commission-based, and have a longer time period until retirement. As noted above, one must interpret survey results like these with caution as survey responses can be unreliable.

Table VI. Backward Elimination Regression Model

Table VI shows the results from the backward elimination regression model. Data shown within a row indicates the values of coefficients associated with independent variables with p-values less than 0.15 associated with each variable in parentheses. The columns represent the results from each dependent variable assigned to measure the endowment effect. Shaded columns represent dependent variables where the statements used to measure the endowment effect were worded such that higher values of the variable were inversely related to the endowment effect.

Variable (pr<|t|)	Worth	Replacement	FeePay Swap	Equivalent Asset	Equivalent Cash	Know Seller	Above Value	Pay Asset
Intercept	3.56 (<0.0001)	4.78 (<0.0001)	3.36 (0.0127)	4.57 (<0.0001)	-0.24 (0.8462)	1.42 (0.0935)	3.43 (0.0008)	4.95 (<0.0001)
Knowledge Investing								-0.31 (0.1141)
Level of Investment Knowledge				-0.27 (0.1276)		-0.33* (0.0447)		
Formal Training			-0.23** (0.0110)	0.20* (0.0629)	0.18** (0.0444)	0.27** (0.0149)		0.25*** (0.0094)
Acquire Asset								
Homeowner				-0.56* (0.0663)				-0.49* (0.0372)
Education		-0.33* (0.0524)						
Gender			-0.62* (0.0984)					
Height			-0.19* (0.0536)					
Going Out			-0.17 (0.1172)					
Extravert ed	0.20* (0.0473)		0.30***			0.13 (0.1437)		

			(0.0041)					
Optimism	-0.42*** (0.0009)		-0.25** (0.0415)				-0.24* (0.0569)	
Good Things							0.28 (0.1434)	
Confidence Completion					0.37 (0.1464)			
Length Owned		-0.39*** (0.0002)				0.19* (0.0352)		
Age			-0.22** (0.0447)	-0.42* (0.0554)				
Gamble		-0.32 (0.1107)	0.31* (0.0857)			-0.28 (0.1291)		-0.41** (0.0117)
Driver			0.48*** (0.0032)	-0.39** (0.0296)		0.29* (0.0839)	-0.27 (0.1327)	
GPA								
Time Retire		0.37*** (0.0016)		0.42** (0.0186)				
Political	0.20 (0.1162)							
Friends Invest			0.32** (0.0272)			-0.27* (0.0608)		
Peer Group			0.17* (0.0997)			0.15 (0.1361)		
Wage Method				0.67** (0.0211)	0.65** (0.0212)	0.63** (0.0161)		
When Sell								

F value	4.54*** (0.0049)	7.06*** (<0.0001)	3.62*** (0.0002)	2.65** (0.0143	3.49** (0.0182)	2.35** (0.0185)	2.23* (0.0883)	3.82*** (0.0061)
R square	0.1092	0.2028	0.2785	0.1467	0.0854	0.1664	0.0574	0.1218
Adjusted R square	0.0851	0.1740	0.2015	0.0914	0.0609	0.0956	0.0317	0.0899

*-Indicates the coefficient/model is statistically significant at the ten percent level.
**-Indicates the coefficient/model is statistically significant at the five percent level.
***-Indicates the coefficient/model is statistically significant at the one percent level.

Conclusions

In this paper, using aggregate theoretical and empirical findings, we create a survey that is used to test characteristics associated with the endowment effect. We use survey responses from more than 150 people regarding assets in their possession. Each person identified an asset that had been acquired with the intent of realizing a future financial payoff or an item that bore significance only in the mind of the holder. This research design is in contrast to most of the previous studies that primarily focus on classroom and laboratory settings, posing manufactured scenarios or setting up experiments allowing study participants to trade nominally valued assets to measure the endowment effect. We then apply definitions from earlier studies as a basis of measuring the endowment effect using previously-noted characteristics and additional control variables. We find some previously unidentified characteristics associated with the endowment effect and provide support for many factors identified in earlier works.

Using multiple regression analysis and statistical modeling techniques including adjusted R-square, RMSE, AIC, forward selection, backward elimination, and stepwise regression methods, those characteristics most consistently and repeatedly appearing across multiple methods include individuals who gamble more, have less formal training in investments, those who are male, are less optimistic, have held the asset in question for longer periods of time, have a component of their income as commission-based, and have a longer time period until retirement. One of the surprising findings of this study relative to previous research is that we find men are more disposed to the endowment effect than women. This finding is in contrast to previous research that finds women are more likely to overvalue assets in their possession (see for example Jefferson and Taplin 2011; Bauer and Schmidt 2012). We hypothesize that it is at least in part due to the nature of this study. Studies indicate that women are more able to conjure emotion in scenario studies. They are better able to imagine a friend giving them an asset and, because they are more communal by nature, value that asset more. In this case we ask participants about actual assets they own. Morewedge et al. (2009) argue that the endowment effect may have more to do with individuals associating assets with themselves (called the ownership view) than with loss aversion. It is possible that men may feel the possession self-link more than women. They may also feel more like they are giving up a piece of themselves when they consider selling or swapping an asset. However, this is a theory and more research needs to done on the differences between men and women with respect to the endowment effect. These results add to the understanding of the endowment effect first, because in contrast to much of the work in this area, we survey individuals on their feelings of the worth of actual assets they own.

Second, while various studies identify one to two factors that they show contribute to the endowment effect, such as gender or the relationship with the seller, we examine nearly all of the identified contributing factors in the literature, and examine the variables simultaneously. These findings contribute to the existing literature in behavioral finance and assist financial advisors in making clients better aware of behavioral characteristics that may cloud their decision-making processes.

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Appendix - Questionnaire

For this questionnaire an individual is asked to consider an object of value. This object may be one acquired with the intent of realizing a future financial payoff such as a portfolio of securities, or can be an item which bears significance only in the mind of the holder such as a collection of baseball cards, or ownership of a set of seats to a professional sporting event. Other items to be considered could include a home, land, a family heirloom, or a souvenir. The key to this study is that the asset being considered is of tangible and measurable value in a marketplace as well as by the participant in the study.

Questions 1 – 9: Please respond to the following questions on a scale of 1 through 5, where 1 represents a statement you completely DISAGREE with. 2 – Slightly DISAGREE. 3 – Neither DISAGREE or AGREE. 4 – Slightly AGREE. 5 Completely AGREE with.

1. My chosen asset is worth more than the estimated market value of my asset. (Worth) (Essentially the definition – no specific reference)

2. If I lost my asset and was given the opportunity to replace my asset with a similar asset of equal market appraised value, the replacement would be just as valuable to me. (Replacement) (justification: Knetsch, Fang-Fang, and Thaler, 2001)

3. I would be willing to pay a fee to avoid a situation where my asset would be swapped for a similar asset of equal market appraised value (e.g., swap a house for a house with the same market value). (FeePaySwap)
(justification: Kahneman, Knetsch, and Thaler, 1991)

4. If I acquired an additional asset which was similar to and of equal market value with respect to the market value of my original asset, both of the assets would be of equal value in my mind. (EquivalentAsset)
(justification: the disparity between WTA and WTP measures of value. Having more experience / trusting the market – which can be looked at based upon controls).

5. If I then had the original asset taken from me, and was given compensation equal to the price I paid to acquire the second asset, it would be fair. (EquivalentCash) (justification: variation of previous question)

6. If I knew the person (seller) who was the owner of a similar asset which I was to acquire with an equal market value to my current asset, I would consider that asset of equal (identical) value (KnowSell)
(justification: Jefferson and Taplin, 2011)

7. I would be able to sell my asset above the stated market price that it is supposedly worth without much trouble (AboveValue). (justification: Haltiwanger and Waldman, 1985)

8. If I were to purchase a similar asset with the same market value as that of my current asset, I would be willing to pay the price that I would sell my asset for under separate conditions. (PayAsset)
(justification: Nataf and Wallsten, 2013)

For the following questions, please respond.
1. Identify your gender. (Gender)
(justification: Bauer and Schmidt, 2012)

2. Identify your age range (# - Fill In) (Age)

3. Identify the asset you used for consideration for this survey (Asset) (justification: Jefferson and Taplin, 2011)

4. Market Price of the object (perhaps as a % of annual income) (justification: Bauer and Schmidt, 2012)

5. What is your occupation? (Kahneman, Knetsch, and Thaler, 1990)

Management (Occupation)
Business and Financial Operations
Computer and Mathematical
Architecture and Engineering
Life, Physical, and Social Science
Community and Social Services
Legal
Education, Training, and Library
Arts, Design, Entertainment, Sports, and Media
Healthcare Practitioners and Technical
Healthcare Support
Protective Service
Food Preparation and Serving Related
Building and Grounds Cleaning and Maintenance
Personal Care and Service
Sales
Office and Administrative Support
Farming, Fishing, and Forestry
Construction and Extraction
Installation, Maintenance, and Repair
Production Occupations
Transportation and Material Moving
Military
Other

6. Highest Level of Education (Education)

7. Primary area of study in highest level of education (FieldStudy)

8. Method of wage determination (WageMethod)

9. How was the asset selected for this survey acquired (AcquireAsset) (justification: Kahneman, Knetsch, and Thaler, 1990; Jefferson and Taplin, 2011)

10. Was the item acquired solely for the intent to eventually sell? (justification: Kahneman, Knetsch, and Thaler, 1990)

11. Length of time asset has been owned. (LengthOwned)(justification: Coursey, Hovis, and Schulze, 1987)

12. Familiarity and experience with investments, portfolio management, or asset evaluation (FamiliarInvesting)/ portfolios / asset evaluation. (justification: Kahneman, Knetsch, and Thaler, 1990)

13. Self-assessment of the level of investment, portfolio management, or asset evaluation knowledge (LevelInvestmentKnowledge). (justification: Kahneman, Knetsch, and Thaler, 1990)

14. Income level (justification: Bauer and Schmidt, 2012)

15. Height (Height)

16. Are You a Homeowner? (Homeowner) (justification: Kahneman, Knetsch, and Thaler, 1990)

17. Do you gamble or play the lottery? (Gamble) (justification: Arrow, 1982)

18. Do you drive above the speed limit? (Driver) (justification: Arrow, 1982)

19. What was your GPA in school (based on degree associated with your highest level of education)? (GPA)

20. Time horizon until retirement? (TimeRetire)

21. Do you plan to part with the asset? (justification: Kahneman, Knetsch, and Thaler, 1990)

22. If you plan to part with the asset, when will that occur? (WhenSell) (justification: Coursey, Hovis, and Schulze, 1987; Kahneman, Knetsch, and Thaler, 1990)

23. "I spend the typical night going out versus staying in. (GoingOut) (Testing for possible extraversion / introversion) (justification: Arrow, 1982)

24. “I consider myself more extraverted than introverted.” (Extraverted) (Variation of optimism)

25. “I have formal training in investments.” (FormalTraining) (justification: Kahneman, Knetsch, and Thaler, 1990)

26. “The majority of my friends are investors who have significant investment experience.” (FriendsInvest) (justification: Arrow, 1982)

27. “I associate most often with individual who have an equal or similar asset base/net worth.” (PeerGroup) (justification: Arrow, 1982)

28. “I consider myself optimistic rather than pessimistic.” (Optimism) (justification: Haltiwanger and Waldman, 1985)

29. “I believe I will experience good things in life.” (GoodThings) (justification: Haltiwanger and Waldman, 1985)

30. “When I choose to do something, I accomplish the task.” (ConfidenceCompletion) (justification: Haltiwanger and Waldman, 1985)

31. How would you describe yourself politically? (Political) (justification: Schleifer, 1999)