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Market Feedback and Valuation Judgment: Revisited

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MARKET FEEDBACK AND VALUATION JUDGMENT: REVISITED

BY

JULIA FREYBOTE

A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree

Of

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ACCEPTANCE

This dissertation was prepared under the direction of the Julia Freybote Dissertation Committee. It has been approved and accepted by all members of that committee, and it has been accepted in partial fulfillment of the requirements for the degree of Doctoral of Philosophy in Business Administration in the J. Mack Robinson College of Business of Georgia State University.

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ABSTRACT

MARKET FEEDBACK AND VALUATION JUDGMENT: REVISITED

BY

Julia Freybote

April 16, 2012

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Appraisers receive feedback from a variety of sources such as other appraisers, clients and the real estate market. Previous studies find client feedback to introduce an upward bias into commercial and residential appraisal judgments. Hansz and Diaz (2001) find that the provision of transaction price (market) feedback for a previously valued property biases commercial appraisers upwardly in subsequent valuations. The authors provide market optimism, client feedback and a reduced conservatism bias as explanations for their findings. However, previous client and market feedback studies were conducted in upward-trending or booming real estate markets. The identified upward bias in valuation judgments may have been the result of positive real estate market conditions.

This study investigates the impact of transaction price feedback on residential appraisal judgment in a changed appraisal task environment, characterized by a depressed housing market, market pessimism, conservative lenders and a changed residential appraisal industry. As Hansz and Diaz (2001) find an upward appraisal bias in an upward-trending market, I expect market feedback to introduce a downward bias into residential appraisal judgments in a depressed market. Compared to a "no feedback" control group, residential appraisers receiving the feedback that their previous value estimates were too high, compared to the realized transaction price, are expected to make significantly lower subsequent value judgments for an unrelated property. The "too low" feedback is not expected to have an impact on subsequent value judgments.

I test the hypotheses with a controlled experiment using a pre-posttest design. The experimental design has one factor (transaction price feedback) fixed at three different levels ("too low", "too high", "no feedback"). A posttest-only validity control group is added to test for a potential testing bias in the pre-posttest design. This study uses residential expert appraisers, defined as active Oregon State certified residential appraisers, from the Portland metropolitan statistical area (MSA) as subjects. Experimental subjects are randomly selected from a list of all certified residential appraisers in the Portland MSA. Experimental subjects are randomly assigned to the control and treatment groups (10 subjects per group; N=40).

Subjects in the treatment groups and pre-posttest "no feedback" control group are asked to value a lot of vacant residential land in the geographically unfamiliar Roswell, Georgia. After they provide their value estimates for this first valuation case, subjects in the treatment groups are given a note from a seller's broker stating the transaction price for the previously valued property. Subjects in the "too high" feedback group receive a transaction price that is 15% below their estimates and subjects in the "too low" feedback group receive a transaction price that is 15% above their value estimates. The control group receives no feedback. All treatment and control groups are then given a second (unrelated) valuation case of vacant residential land in Newnan, Georgia and asked for their value estimate. The experiment is concluded with an exit questionnaire containing demographic and professional questions as well as manipulation checks.

The experimental data are analyzed using the parametric independent samples t-test. The assumptions of normality and equal variances are not violated by the dataset. A one-way ANOVA and the non-parametric Mann-Whitney U test are used as robustness checks. All statistical tests conclude that neither the mean of the "too high" feedback group nor the mean of the "too low" feedback group are statistically different at the 5% level from the mean of the "no feedback" control group. Thus, no evidence is found that transaction price feedback biases residential appraisal judgments in a depressed market.

The insignificant results are further analyzed to assess whether they are due to a non-reception of the treatment by subjects, low statistical power or a non-existing relationship: The explanation that subjects did not read the treatment note can be excluded. A power analysis reveals low statistical power and very small effect sizes for both treatments. An alternative explanation for the insignificant results is the absence of the hypothesized relationship. The main client group of experimental subjects is appraisal management companies, which due to legislation passed after 2007, work with appraisers on behalf of lenders. As a consequence, residential appraisers do not receive direct client feedback anymore (compared to Hansz and Diaz, 2001) and may not respond subconsciously to the “too high” feedback.

Table of Content

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS

AD – Anderson-Darling

AMC - Appraisal Management Company

ANOVA – Analysis of Variance

AQB - Appraiser Qualifications Board

BPO – Broker Price Opinion

CLT – Central Limit Theorem

Comp(s) – Comparable Sale(s)

DIFFVAL – difference between the estimate for the first and second valuation case

FHA - Federal Housing Administration

HVCC – Home Valuation Code of Conduct

FDIC – Federal Deposit Insurance Corporation

IFA - Independent Fee Appraiser

IRB – Institutional Review Board

JB – Jarque-Bera

KS - Kolmogorov-Smirnov

MLS – Multiple Listing Service

MSA – Metropolitan Statistical Area

NAIFA – National Association of Independent Fee Appraisers

OACLB - Oregon Appraiser Certification and Licensure Board

SRA – Senior Residential Appraiser

SW – Shapiro-Wilk

VA – Veterans Affairs

1 INTRODUCTION

1.1 Background

The main objective of residential and commercial real estate appraisal is to determine the true market value of a property. In order to make an unbiased and objective value judgment, appraisers have to analyze and interpret real estate market conditions. However, compared to other market participants such as brokers and investors, appraisers are not involved in current transactions and, due to their reliance on past transaction data, are at an informational disadvantage regarding current market conditions. Given the characteristics of real estate markets such as segmentation, infrequent transactions and proprietary information, real estate market feedback is valuable to appraisers. It provides appraisers with information about current market conditions and the accuracy of previous valuation judgments. Normative expectations predict an unbiased and symmetric influence of market feedback on valuation judgments. However, Hansz and Diaz (2001) based on the 1999 dissertation of Hansz, find that market feedback asymmetrically biases valuation judgments. Commercial appraisers, who received the feedback that their previous value judgment was too low compared to the realized sales price, made significantly higher subsequent value judgments for an unrelated property in a different geographical market. This relationship does not hold for the "too high" market feedback. Thus, market feedback can lead to non-normative behavior of appraisers. The authors discuss a number of potential explanations for this upward bias: Firstly, commercial appraisers may be used to clients who frequently request upward adjustments and thus automatically adjust upwardly if provided with "too low" feedback. Secondly, appraisers may be optimistic about the real estate market. Lastly, appraisers may have a

conservatism bias, which results in more cautious value estimates. Market feedback reduces this conservatism bias. In conclusion, the findings of Hansz and Diaz (2001) suggest that market feedback provided in rising real estate market conditions induces the upward bias in valuation judgments.

The collapse of the housing bubble in 2007 and the subsequent financial and economic crisis have resulted in significant changes to the appraisal task environment, particularly for residential appraisers. The most severe change is a depressed housing market characterized by negative equity, few transactions, short-sales and foreclosures. The conditions of the depressed market differ significantly from the market conditions at the time Hansz and Diaz (2001) conducted their experiments. Compared to a rising market, lenders in a depressed market are likely to be more conservative and risk-averse in underwriting practices and equity contribution requirements. As a consequence, lenders and other clients are likely to prefer value estimates at the lower end of the justifiable range in order to reduce their risk exposure. The pessimistic market sentiment characteristic of downward-trending real estate markets also affects appraisers.

In addition to the deteriorated real estate market conditions, the appraisal industry has undergone a number of changes since 2007. These changes predominantly affect residential appraisers and include new legislation, litigations and structural changes to the appraisal industry. Legislation such as the Home Valuation Code of Conduct (HVCC) disconnects residential appraisers and residential mortgage lenders by placing appraisal management companies (AMC) between them to eliminate client pressure on appraisers. Residential appraisers have also become subject to litigation, for example, by the Federal Deposit Insurance Corp (FDIC), which is suing appraisers for valuation judgments made

at the height of the residential real estate market boom. Structural changes affecting residential appraisers include an increased importance of AMCs, reduced fees and a more frequent use of the broker's price opinion (BPO) by appraisal clients.

The changed task environment of residential appraisers, characterized by a depressed housing market, a pessimistic sentiment and conservative clients, represents a good starting point to revisit the findings of Hansz and Diaz (2001) and extend their study to residential appraisers. Two previous studies have shown that client feedback biases commercial (Hansz, 2004a) and residential appraisers (Diaz and Hansz, 2010) upwardly. Both studies were conducted in rising commercial and residential markets (2002-2004). These findings suggest that, although commercial and residential real estate differ and commercial valuations tend to be more complex, both types of appraisers behave similarly when exposed to client feedback. My study focuses on market feedback, which implicitly includes client feedback as discussed by Hansz and Diaz (2001). It tests whether residential appraisers, analogously to commercial appraisers, respond asymmetrically to market feedback. If the upward bias in value judgments found by Hansz and Diaz (2001) is the result of upward-trending market conditions, I expect a downward bias in a depressed market.

1.2 Objectives of dissertation

The purpose of this study is to investigate the impact of market feedback on residential real estate valuation judgment in a depressed market. In particular, I investigate whether market feedback provided in a depressed housing market introduces a downward bias into the subsequent valuation of an unrelated property. Following Hansz and Diaz (2001), I define market feedback as simple outcome feedback in form of the transaction price of a previously valued property.

In my analysis, I test the following hypotheses:

H_1: In a depressed market, market feedback in form of the realized transaction price of a previously valued residential property asymmetrically biases the subsequent valuation judgment for an unrelated property.

> ***H_{1a}:*** Compared to a control group receiving no feedback, residential expert appraisers receiving the feedback that their previous value estimates were "too low" with regard to the realized transaction price don't make higher subsequent value judgments on an unrelated property.
>
> ***H_{1b}:*** Compared to a control group receiving no feedback, residential expert appraisers receiving the feedback that their previous value estimates were "too high" with regard to the realized transaction price make lower subsequent value judgments on an unrelated property.

I test my research hypotheses in a pre-posttest experiment with one factor ("transaction price feedback") fixed at three levels: "too low" feedback, "too high" feedback and "no feedback" control group. Analogously to Hansz and Diaz (2001), I also use a posttest-only validity control group to test for a potential testing bias. My experimental subjects are 40 residential expert appraisers defined as Oregon State certified residential appraisers in the Portland MSA. Subjects are randomly selected and randomly assigned to the treatment and control groups.

A pre-posttest experiment is used to test the hypotheses. It consists of two phases: In the first phase subjects of all groups, except the validity control group, are asked to value a plot of vacant residential land in a geographically unfamiliar location (Georgia). After completion of the first valuation case, subjects in the treatment groups are administered their treatment. The transaction price feedback treatment is in form of a handwritten note by the seller's broker of the previously valued property (valuation case 1). The transaction price shown in the note either exceeds the previous valuation by 15% ("too low"-level) or is below the previous valuation by 15% ("too high"-level). In the second phase of the experiment, subjects of the treatment and control groups, including the validity control group, are required to value an unrelated plot of vacant residential land, located in a different county in Georgia than the previous property. To determine the differences between experimental groups, a variety of statistical methods are used, such as the independent samples parametric t-test, analysis of variance (ANOVA) and the non-parametric Mann-Whitney U-test.

1.3 Limitations of the study

Hansz and Diaz (2001) present three explanations for the identified upward bias in subsequent value judgments: (1) client behavior/feedback, (2) market sentiment or mood and (3) conservatism bias. A detailed analysis of any of these three hypotheses is beyond the scope of this dissertation. The experimental design of this study doesn't explicitly include any client-agent effects that would reflect client feedback. Additionally, no mood affecting manipulations (e.g. to introduce market pessimism) or conservatism bias-related manipulations are made. However, the implicit manipulation in my experiment is "real estate market conditions": As shown by Hansz and Diaz (2001), the mindset of experimental subjects is affected by current real estate market conditions. Daily work experiences of subjects, such as a pessimistic market sentiment and client expectations, introduce depressed market conditions into the experiment.

This study does not account for decision tools such as CoStar as used in Tidwell (2011). The author uses technology to test whether it mitigates the effect of the anchoring and adjustment bias on valuation judgments. My study does not include any decision tools for the following reasons: Firstly, the findings of Tidwell (2011) indicate no difference between value judgments of CoStar and non-CoStar using groups, suggesting no significant impact of decision tools on appraisal decision-making. Secondly, compared to the anchoring study of Tidwell (2011) focusing on commercial appraisers, the investigation in hand focuses on market feedback and residential appraisers, who don't use CoStar. Thirdly, while information provided by tools such as CoStar for commercial appraisers or Multiple Listing Service (MLS) databases for residential appraisers represents market feedback (e.g. transaction prices and market reports), the wealth and

presentation of information provided does not allow to experimentally test the distinct impact of a particular type of feedback (e.g. simple outcome feedback). Such technology-based information tools for appraisers may also introduce confounding effects.

1.4 Contribution of dissertation

This study contributes to the existing behavioral literature on real estate valuation in the following ways: Compared to studies focusing on the anchoring and adjustment bias and valuation judgments (e.g. Tidwell, 2011; Cypher and Hansz, 2003; Diaz and Hansz, 2001; Hansz, 2004b; Diaz and Wolverton, 1998; Diaz and Hansz, 1997; Diaz, 1997; Wolverton, 1996; Gallimore, 1994), few studies investigate the impact of feedback on appraisal behavior (e.g. Diaz and Hansz, 2010; Levy and Schuck, 2005, 1999; Hansz, 2004a; Wolverton and Gallimore, 1999; Kinnard, Lenk and Worzala, 1997). Feedback studies, with the exception of Hansz and Diaz (2001) and Hansz (1999), on the other hand predominantly focus on the impact of client feedback on valuation judgment. The study in hand thus adds to the scarce literature on market feedback and appraisal behavior.

The majority of experiments in the behavioral real estate valuation literature were conducted in an upward-trending or booming real estate market environment. (e.g. Hansz and Diaz, 2001; Diaz and Hansz, 2001) These real estate market conditions may have had an effect on the outcome of previous experiments. This study is the first to investigate the relationship of feedback and valuation judgment in a depressed real estate market. The current residential real estate market crisis represents an ideal background and timing for such an investigation, making this study highly relevant.

Additionally, residential real estate appraisers have received considerably less attention than commercial appraisers in the behavioral real estate literature. While some studies investigate the behavior of residential appraisers (e.g. Diaz, Gallimore and Levy, 2004, 2002; Gallimore and Wolverton, 1997; Diaz, 1990), only three studies, Diaz and Hansz (2010) as well as Gallimore and Wolverton (2000) and Wolverton and Gallimore (1999) to some extent, investigate the impact of feedback on residential valuation judgments. All three studies, however, focus on client feedback. The study in hand is the first market feedback study in residential appraisal.

1.5 Organization

Following the introductory Chapter 1, Chapter 2 presents a literature review of behavioral real estate studies with a focus on studies investigating the impact of feedback on value judgments. Chapter 3 presents the hypotheses and experimental design (data and methodology). It is followed by the results in Chapter 4. Chapter 5 presents a conclusion.

2 LITERATURE REVIEW

The following chapter presents a literature review. It spans psychology, accounting, forecasting and behavioral real estate. The first part reviews the existing behavioral literature in real estate valuation, particularly the impact of feedback on valuation judgment. The second part discusses changes to the residential appraisal task environment.

2.1 Behavioral studies in real estate valuation judgment

2.1.1 The behavior of appraisers

Real estate valuation has received the most attention in the behavioral real estate literature. The objective of real estate appraisals is the unbiased, independent and objective assessment of the true property market value. A normative appraisal process has been formulated to ensure the unbiasedness and objectiveness of value judgments. The normative valuation model is based on human information processing as discussed by Simon (1978) and Simon and Newell (1972). It forms part of appraisal training in the US and prescribes a series of steps to be taken in solving valuation problems. (For a depiction of the normative valuation process, see Diaz, 1990; Diaz, Gallimore and Levy, 2002) However, actual behavior of expert appraisers differs from the prescribed normative model. While novice appraisers with limited experience adhere to the normative process to solve valuation problems, the problem-solving behavior of expert appraisers is more efficient and based on production rules developed with increasing experience. These efficient production rules are applied automatically to routine problems resulting in eliminations or alterations of prescribed steps and consequently a deviation from the normative valuation process. (Diaz, 1990) In experiments, Diaz (1990)

finds that expert appraisers deviate from the normative process when valuing a residential property in familiar as well as unfamiliar geographical areas. In an international extension to Diaz (1990), Diaz, Gallimore and Levy (2004, 2002) suggest that appraisal behavior in the US, UK and New Zealand is non-normative and that these findings are not dependent on geographical familiarity.

Behavioral real estate studies examining the non-normative behavior of appraisers can be distinguished into two streams: Anchoring studies investigate the anchoring and adjustment heuristic bias and feedback studies focus on the impact of client and market feedback on value adjustments. Both streams of literature are reviewed in the following sections. As feedback studies are in the focus of this study, the review of anchoring studies is condensed.

2.1.2 Anchoring studies

The environment in which appraisers make valuation judgments is characterized by uncertainty, complexity and constant changes. With regard to the limited information processing ability of humans (Simon, 1978; Simon and Newell, 1972), the use of heuristics (short cuts or production rules) allows appraisers to acquire relevant data and solve familiar problems more efficiently and simple. However, heuristics can lead to systematic judgment biases, for example, if problem-solving tasks or characteristics of a problem are unpredictable, uncertain and difficult. (For an in-depth review and discussion, see Hardin, 1999) Heuristic biases represent a serious threat to the unbiasedness and independence assumption of valuations. A number of heuristics and heuristic biases have been identified (Tversky and Kahneman, 1974) and investigated in real estate negotiations (e.g. Diaz, Zhao and Black, 1999), valuation (e.g. Diaz, 1997;

Hansz and Diaz, 2001; Gallimore, 1996), investment (e.g. Clauretie and Thistle, 2007; Roberts and Henneberry, 2007; Lambson, McQueen and Slade, 2004), lending (e.g. Hardin, 1997) and pricing (e.g. Northcraft and Neale, 1987).

The anchoring and adjustment bias is of particular importance to real estate valuation as appraisers frequently have knowledge of pending sales prices (Gallimore and Wolverton, 1997), previous value estimates, pending mortgage amounts, transaction or listing prices. Anchoring and adjustment represents a heuristic in which individuals start from an initial value ("anchor") and then adjust upwards or downwards to yield a judgment. Insufficient adjustment leads to a bias of the final estimate towards the anchor. (Tversky and Kahneman, 1974) If appraisers choose incorrect anchors or make insufficient adjustments, the resulting valuations are biased away from the true market value. With regard to the importance of objective valuations to mortgage lending, investment and portfolio management such a violation of the unbiasedness assumption represents a tremendous problem to the real estate industry.

Studies on the anchoring and adjustment bias in valuation have shown that novice and expert appraisers base their value judgments on various external (suggested) and internal (self-established) anchors. A number of external anchors affecting appraisers have been identified previously: Northcraft and Neale (1987) use brokers and find that both expert and student subjects anchor their estimates of appraised value, advertised selling price, a reasonable purchasing price and lowest offering price on the listing price of residential property. The credibility of an anchor, defined as its distance from the true market value, does not affect the strength of the bias. Gallimore (1994) finds support that expert appraisers base their judgment of property price variability on external anchors. Diaz

(1997) analyzes the impact of the value judgment of an anonymous expert on the value judgment of apprentice and expert appraisers for a commercial property in an area they are familiar with. Although the results are in the expected direction suggesting the presence of an anchoring bias, the results are insignificant. Diaz and Hansz (1997) find that commercial expert appraisers unfamiliar with a geographic area anchored their value estimate on the value judgment of an anonymous expert. Gallimore and Wolverton (1997) show that knowledge of the pending sales price introduces a valuation bias by affecting the selection of comparable sales. In their study, appraisers in the UK and US anchor their value estimates on the pending sales price of the residential subject property. Wolverton (1996) finds that the knowledge of sales price, but not listing price, biases the comparable sales selection in a residential valuation. Hansz (2004b) provides evidence that expert appraisers use the prior transaction price of a commercial subject property as anchor. Diaz and Hansz (2001) test the anchoring behavior of expert appraisers on a number of different reference points. The reference points used are the value judgment of an anonymous appraiser, the unclosed current contract price of the subject property and a highly comparable property. The authors find that these anchors bias the value judgment of commercial real estate appraisers to varying degrees depending on whether these reference points are explicitly or implicitly sanctioned by the normative appraisal process. Cypher and Hansz (2003) find no evidence that expert commercial appraisers anchor on assessed value reference points. Tidwell (2011) is the first one to investigate whether decision tools such as CoStar reduce the anchoring bias in valuation judgments. The author finds that commercial appraisers without access to CoStar anchor on external reference points (opinion of an anonymous expert) to some extent while appraisers with

access to CoStar are not susceptible to external anchors. However, no statistical difference is found for the mean value judgment of appraisers in the CoStar and non-CoStar group suggesting that CoStar is unable to debias appraisers.

Besides external anchors, appraisers have been found to also use internal anchors. Diaz and Wolverton (1998) investigate the anchoring bias as an alternative explanation of appraisal smoothing. They find that when appraisers update appraisals of the same commercial property (multi-family) they make insufficient temporal adjustments and fail to weigh new information appropriately. Havard (1999) investigates whether appraisers use previous valuation judgments as anchor. Using student appraisers, he finds that commercial appraisers indeed anchor on previous valuations of the same property. Additionally, he shows that appraisers are more willing to adjust a previous (suggested) low value estimate upwards than a previous (suggested) high estimate downwards. This study was conducted in the same rising real estate market environment as Hansz (1999) and Hansz and Diaz (2001), which may explain the similar findings. The findings of Clayton, Geltner and Hamilton (2001) additionally show an anchoring behavior of appraisers on earlier valuations resulting in insufficient adjustments. The authors conclude that the extent to which appraisers anchor on previous value judgments, i.e. weighing previous valuations and new information, depends on the phase of the market cycle, i.e. the related quality and quantity of information.

2.1.3 Feedback studies

2.1.3.1 Client feedback

Appraisers are influenced by client and market feedback. The majority of feedback studies takes a principal-agent perspective and analyzes the impact of client feedback on valuation judgments. Client feedback in this context includes client pressure, but is not limited to it. Levy and Schuck (2005, 1999) provide an overview of the motivations for and methods of client influence on appraisers. Wolverton and Gallimore (1999) investigate the impact of different dimensions of outcome feedback provided by clients on residential and commercial appraisers. The authors distinguish environmental perception feedback (e.g. Client asks to consider other comparables.), coercive feedback (e.g. Client pressures appraiser into increasing the estimate by threatening to send less work and/or remove appraiser from list.) and positive reinforcement feedback (e.g. Client does not discuss value judgment, is grateful and/or sends more work). Using a survey, the authors find evidence that client pressure (environmental perception and coercive feedback) leads appraisers to perceive their role in the lending process as validating the anticipated sales price instead of determining the objective market value, as outlined by the normative valuation process. Thus, if the value estimate is below the anticipated sales price, feedback by lenders is likely to influence appraisers to adjust their valuation judgment upwards. Positive reinforcement feedback on the other hand results in a more normative judgment behavior of appraisers and thus is likely to improve valuation judgment performance. Studies replicating Wolverton and Gallimore (1999) in Nigeria (Amidu, Aluko and Hansz, 2008) and the UK (Gallimore and Wolverton, 2000) yield varying results, which are likely due to differences in culture, business and training. Hansz (2004a) investigates the impact of client feedback on commercial valuation

judgments. He finds that appraisers facing client pressure in form of a pending mortgage amount make significantly higher value judgments than appraisers without this feedback. Using a different methodology than Hansz (2004a) and focusing on residential appraisers, Diaz and Hansz (2010) come to the same conclusion that client feedback (pressure) biases valuation judgments. Kinnard, Lenk and Worzala (1997) conclude that client size, proxying for the dependence of an appraiser on a client's business, has a direct effect on a decision of a commercial appraiser to revise value judgments in order to accommodate adjustments requested by the client. The size of the requested adjustment however, has no impact on the behavior of an appraiser.

2.1.3.2 Market feedback

The impact of market feedback on valuation judgment has received little attention in the behavioral real estate literature so far. Based on Hansz' (1999) dissertation, Hansz and Diaz (2001) investigate the impact of market feedback on commercial real estate valuation judgments in a pre-posttest design. The authors focus on simple outcome feedback in form of transaction price information received after the initial valuation judgment was made. The authors find transaction price feedback on a previously valued property affects the subsequent value judgment for an unrelated property. However, contrary to normative expectations, the impact of market feedback on value judgments is not symmetrical. Expert subjects in the experiment give a higher weight to the "too low" feedback. If market feedback suggests the previous valuation was too low, subsequent unrelated valuation judgments are significantly higher. Receipt of a "too high" feedback does not lead to significantly lower subsequent value judgments for an unrelated property. Although Hansz and Diaz (2001) have no definite explanation for the

asymmetric response, they provide three hypotheses: The first one is appraiser-client considerations, which is in line with the literature on client feedback and valuation judgment (e.g. Wolverton and Gallimore, 1999). As discussed, these studies show that client demands induce an upward bias in valuations. Cho and Megbolugbe (1997) find that 80% of all valuations reviewed in their study are equal to or higher than the transaction price (0 to 5%). The authors argue that this bias is the result of a strong interest in higher value estimates by all parties involved in mortgage lending. Appraisers may thus unconsciously react to "too low" feedback by automatically adjusting subsequent value judgments upwards. This argument emphasizes the link between client and market feedback: The latter implicitly includes the former. The second hypothesis is optimism in the real estate market and the assumption of rising real estate values. This optimism would result in appraisers putting a higher weight on positive information and under-reacting to negative information. The third hypothesis is a reduced conservatism bias. Faced with uncertainty, appraisers exhibit conservatism in their valuation judgments. Outcome feedback such as transaction prices provides appraisers with additional information about market conditions, which increases confidence and reduces uncertainty. The decreased uncertainty about market conditions is likely to lead to an upward bias.

2.1.3.3 Outcome feedback as market feedback

Hansz and Diaz (2001) define market feedback in form of transaction price feedback as simple outcome feedback. While a detailed discussion of the existing literature on outcome feedback is beyond the scope of this chapter, the following section briefly reviews this type of feedback. The majority of studies in accounting/auditing and

forecasting, two fields in which feedback and expert judgment have been extensively studied, conclude that judgment with feedback is better than judgment without feedback (e.g. Önkal and Muradoglu, 1995; Hirst and Luckett, 1992). While the results are mixed, a number of studies in psychology, accounting and forecasting has shown that feedback can improve accuracy of judgments and quality of decision-making (e.g. Remus, O'Connor and Griggs, 1996; Subbotin, 1996; Önkal and Muradoglu, 1995; Hirst and Luckett, 1992) as it allows individuals to acquire new information, learn and thus develop expertise. Outcome feedback can be defined as "information about the realization of a previously predicted event" (Önkal and Muradoglu, 1995) and provides information about the correctness of a judgment (Leung and Trotman, 2008). It has been found to increase the confidence and even overconfidence of subjects. (Goodwin et al., 2004; Subbotin, 1996) Advantages of outcome feedback are its ease of computability and understandability. Compared to other feedback types based on averages, outcome feedback introduces a bias towards the most recent value or data point. Goodwin et al. (2004) find if interval forecasts are the desired outcome, the provision of outcome feedback (with labels) improves confidence intervals. . In determining value estimates, appraisers work with an interval of values they are confident with. Outcome feedback may thus be able to improve value estimate confidence intervals. Remus, O'Connor and Griggs (1996) argue that outcome feedback may be particularly good when forecasting in a task environment with recurrent forecasts and unexpected turning points. Such a task environment is given in real estate valuation where appraisers are faced with unexpected changes in real estate market conditions and recurrent appraisals. Thus, outcome feedback theoretically may be beneficial to real estate appraisers.

Outcome feedback appears to be most effective for linear, highly predictable and low complexity tasks. (Leung and Trotman, 2005; Goodwin et al., 2004; Hirst and Luckett, 1992) Bonner and Walker (1994) defined two conditions for outcome feedback to be effective: (1) the task has to be sufficiently simple such as a small number of cues, highly predictable or simplified so that experimental subjects, after receiving feedback, can reason backwards from the realized outcome to the different steps of their cognitive strategies in order to develop explanations for the outcome; (2) subjects have a causal theory of the domain, i.e. prior knowledge, before receiving feedback. Hirst and Luckett (1992) assume that the task of auditor performance evaluation is highly predictable and decision makers possess a high knowledge of this task. With these assumptions, outcome feedback has been found to improve judgment as it allows subjects to acquire task knowledge over time. The improved task knowledge (learning) from outcome feedback results in an improvement in the accuracy of judgments even when task predictability is less than perfect (Hirst, Luckett and Trotman, 1999), which is a much more realistic assumption for fields such as auditing or real estate. Using an experimental design in which auditors have to conduct an unfamiliar real estate valuation, Earley (2003) finds that if outcome feedback is provided before auditors are asked to self-explain the outcome, their performance is improved. Thus outcome feedback is able to improve the reasoning ability of auditors when faced with a new problem.

While previous research in psychology and accounting/auditing literature may suggest outcome feedback could improve real estate appraisal judgment, the focus of this study is on whether transaction price (outcome) feedback introduces a bias in valuation judgment. The experiment is designed correspondingly (e.g. valuation cases set in two different

geographical markets). An analysis of the beneficial properties of outcome feedback to real estate appraisal is beyond the scope of this study, but represents a starting point for further research into feedback and real estate valuation.

2.2 Changes to the appraisal task environment and industry

Since Hansz (1999) and Hansz and Diaz (2001) conducted their experiments the appraisal task environment, particularly of residential appraisers, experienced two tremendous changes. Firstly, residential and commercial real estate market conditions have changed significantly. The above studies were conducted in rising or booming commercial real estate markets. Expert appraiser subjects in these studies were likely to be relatively optimistic and used to clients requesting value judgments at the upper end of the justifiable value range. Anticipating increasing market values, appraisers were more likely to feel comfortable to accommodate these client requests. The collapse of the US housing bubble in 2007 and the resulting financial and economic crisis led to a depressed residential real estate market characterized by negative equity, low transaction volume, foreclosures and short-sales. Following the downturn of the economy, commercial real estate markets have experienced high vacancies, negative absorption, rising cap rates and falling rents. These depressed real estate markets affect client behavior and expectations as well as market sentiment: Clients such as banks and other mortgage lenders are more conservative in underwriting standards and equity contribution requirements. Faced with stagnant or declining real estate values and increased defaults in a depressed market, lenders are interested in reducing their exposure to mortgage default risk. Client demands for upwardly adjusted value judgments are not likely in a depressed market. Rather, clients are more likely to be interested in conservative estimates at the lower end of the

justifiable value range. Furthermore, a depressed real estate market and prevalent pessimistic market sentiment are likely to eliminate any optimism appraisers might have about the development of values and prices.

Additionally, a depressed market represents a tremendous challenge to the estimation of the true market value. Such a market is characterized by a significantly reduced number of buyers, a pessimistic market sentiment and future expectations, which lead to a reduction in transactions. The reduced availability of transaction information reduces available sales comparables. Reduced market activity not only affects the sales comparison approach to valuation, but also the cost approach (e.g. fewer comparable sales for land valuation) and the income approach (e.g. unreliable multiplier and capitalization rate information based on fewer comparable sales) for commercial properties. A depressed market and the resulting uncertainty about, for example market conditions, comparable sales, capitalization rates or future trends, are likely to affect valuation judgments and adjustments. McAllister et al. (2003) argue that appraisers, when faced with a lack of transaction data, react to such a changed property market in three ways: they either make no adjustment, a delayed adjustment or a conservative adjustment. The authors' findings suggest that appraisers are less likely to make extreme adjustments reflecting the full downward trend in the commercial real estate market. This finding is in line with the conservatism bias argument in Hansz and Diaz (2001).

The second change to the appraisal task environment affects mostly residential appraisers. The involvement of residential appraisers in the most recent housing crisis has resulted in a number of changes to the residential appraisal industry in terms of legislation, litigation and structure. Client feedback and/or pressure on appraisers as

investigated by Wolverton and Gallimore (1999) and Hansz (2004a) has been identified as one of the factors contributing to inflated real estate values and faulty mortgages. As a consequence, legislation such as the 2008 Home Valuation Code of Conduct (HVCC), effective as of May 1 2009, and the 2010 Dodd-Frank regulatory financial reform bill, effective as of July 21 2010, have been passed to ensure the independence of residential appraisers from clients in general and lenders in particular. The HVCC requires the separation of valuation and the lender's sale and loan production functions for residential mortgages to be sold to Fannie Mae and Freddie Mac. This separation is achieved by placing an appraisal management company (AMC) between lender and appraiser. The AMC selects and contracts individual appraisers. (Abernethy and Hollans, 2010) Local banks or credit unions that don't resale mortgages in the secondary mortgage market are not required to use AMCs. The Federal Reserve Board's Interim Final Rule, mandated by the Dodd-Frank regulatory financial reform bill, goes further than the HVCC and requires the independence of appraisers from the influence or pressure of any party with an interest in a particular real estate transaction. (Anonymous, 2010) In addition to federal legislation, most states passed laws to ensure the independence of appraisers from lenders. (Garber, 2009)

This new legislation is complemented by increased residential appraiser licensing and certification requirements. Effective as of January 1, 2008, the Appraiser Qualifications Board (AQB) introduced revised licensing criteria, which include increased education and experience requirements. (Appraiser Qualifications Board, 2010) The revised requirements aim at improving the quality of appraisals and reducing the number of insufficiently qualified appraisers. Federal agencies such as the Federal Housing

Administration (FHA) have also increased their requirements for residential appraisers: In order to work for the FHA, appraisers have to be certified and not just licensed. (Rattermann, 2010)

In the aftermath of collapse of the housing bubble and subprime mortgage crisis, residential appraisers have been subject to litigation holding them accountable for their perceived contribution to the crisis. The Federal Deposit Insurance Company (FDIC) has filed lawsuits against residential appraisers, who conducted appraisals at the height of the residential real estate market boom for mortgages originated by banks that subsequently failed (e.g. IndyMac). The FDIC targets particularly appraisers with errors & omission insurance. (Mook, 2011) Other FDIC lawsuits were filed against appraisal management companies for hiring unqualified appraisers and conducting faulty appraisals. (Ulam, 2011; Puente, 2011) The outcome of these lawsuits will be groundbreaking for subsequent lawsuits by private parties such as mortgage-backed security investors. (Ulam, 2011)

Besides legislation and litigation, the residential appraisal industry has experienced other structural changes. The increased importance of AMCs, particularly as a result of the HVCC, has resulted in a reduction of fees for individual appraisers, as the fee paid by clients is split between AMC and appraiser (Alen, 2011). Lower fees and less work due to a depressed housing market have resulted in appraisers, particularly senior and experienced, leaving the industry. Combined with reduced recruitment, these developments may negatively affect the quality of appraisals and the ability of the appraisal industry to serve clients in a rising market in the future. (Lepro, 2011) New competition for appraisers has also arisen from automated valuation systems that are

frequently used by residential brokers and homebuyers/sellers (Rattermann, 2010; Hurley, 2007) and brokers making value judgments. Depressed residential real estate market conditions have increased the importance of the broker price opinion (BPO), which has been used increasingly as a tool for foreclosure, short-sales and loan modifications. As brokers do not have the same education as appraisers, a number of states have developed legislation to restrict BPOs to providing sellers and buyers with a listing or purchase price and avoiding the use of BPOs particularly for mortgage lending. (Garber 2009) Finally, the recent real estate crisis and the involvement of appraisers have sparked an industry-wide debate about issues such as value definitions and valuation principles (Hanford, 2011; Parli and Fisher, 2010; Quentin, 2009) and the ways in which appraisers can avoid mortgage fraud. (Martin, 2009)

In conclusion, the appraisal task environment, particularly of residential appraisers, has changed significantly since Hansz (1999) and Hansz and Diaz (2001) conducted their experiments. Depressed housing market conditions, risk-averse and conservative lenders, the increased risk of being sued for value judgments, legislative and structural changes to the residential appraisal industry are likely to affect the direction of the response of appraisers to transaction price market feedback. The recent study of Tidwell (2011) finds supporting evidence that appraiser behavior is affected by real estate market conditions. The author shows that commercial appraisers anchor asymmetrically on low reference points in a falling market resulting in lower value judgments.

3 DATA AND METHODOLOGY

3.1 Hypotheses

The findings of Hansz (2004a) and Diaz and Hansz (2010) suggest that, despite their differences, commercial and residential appraisers behave similarly when exposed to client feedback. I focus on market feedback, which implicitly includes client feedback (Hansz and Diaz, 2001), and expect an asymmetric response of residential appraisers to market feedback: If the upward bias to market feedback found in Hansz and Diaz (2001) and Hansz (1999) is the result of upward-trending real estate market conditions, I expect an downward bias in a depressed market. Based on the previous literature review and discussion of the current residential appraisal task environment, I test the following research hypotheses, which translate into testable hypotheses as shown in Table 1 and 2.

H_1: In a depressed market, market feedback in form of the realized transaction price of a previously valued residential property asymmetrically biases the subsequent valuation judgment for an unrelated property.

> ***H_{1a}:*** Compared to a control group receiving no feedback, residential expert appraisers receiving the feedback that their previous value estimates were "too low" with regard to the realized transaction price don't make higher subsequent value judgments on an unrelated property.
>
> ***H_{1b}:*** Compared to a control group receiving no feedback, residential expert appraisers receiving the feedback that their previous value estimates were "too high" with regard to the realized transaction price make lower subsequent value judgments on an unrelated property.

Table 1: Testable Hypotheses		
Research hypotheses	***Null hypotheses***	***Alternative hypotheses***
RH_{1a}	H_0: $DIFFVAL_{too\ low} = DIFFVAL_{NF}$	H_A: $DIFFVAL_{too\ low} \neq DIFFVAL_{NF}$
RH_{1b}	H_0: $DIFFVAL_{too\ high} \leq DIFFVAL_{NF}$	H_A: $DIFFVAL_{too\ high} > DIFFVAL_{NF}$
Table 2: Testable Hypotheses (Robustness Check)		
RH1	H_0: $DIFFVAL_{NF} = DIFFVAL_{too\ low} = DIFFVALL_{too\ high}$	H_A: not all group means are equal
Note: In the above table, $DIFFVAL_{NF}$ indicates the mean of the difference between the estimates for valuation case 2 and 1 (V2-V1) for the "no feedback" control group, $DIFFVAL_{too\ low}$ indicates the mean of V2-V1 for the "too low" feedback treatment group and $DIFFVAL_{too\ high}$ indicates the mean of V2-V1 for the "too high" feedback treatment group. DIFFVAL for each subject is multiplied by (-1) to make it a positive number.		

3.2 Experimental design

To test my hypotheses, I design a true (randomized) experiment. As subjects are aware of their participation in the experiment and the experiment is controlled, it also represents a laboratory experiment. "Experimentation" hereby represents the research strategy and "laboratory" the research setting. (Fromkin and Streufert, 1976) The structure or design of my experiment is shown in Table 3. I employ a pre-posttest experiment to test the cause-effect relationship between market feedback and value judgment. This experiment is designed to meet the three criteria of a causal relationship: temporal precedence, covariation of cause and effect as well as no alternative explanations. (Trochim and Donnelly, 2008)

As shown in Table 3, my experiment has one factor fixed at three levels. Trochim and Donnelly (2008) define factorial designs as signal-enhancing experimental designs. My factor or independent variable is transaction price (market) feedback. This factor has three levels: "too high", "too low" and no feedback. For internal validity reasons (see section 3.3) and construct validity reasons (see section 3.5), I also include a pre-posttest ("no feedback") control group that doesn't receive any feedback and a posttest-only validity control group.

Table 3: Experimental Design

Transaction price feedback group: *"too low"*	R	O	X_1	O
Transaction price feedback group: *"too high"*	R	O	X_2	O
No feedback control group	R	O		O
Validity control group	R			O

Note: In the above table "R" indicates random assignment, "O" an observation or measure and "X" a treatment.

The experimental design is implemented as follows: At the beginning of the experiment subjects are randomly assigned to one of the two treatment groups and two control groups. Subjects in all groups, except the posttest-only validity control group, are given valuation case 1 (see Appendix A). Subjects are asked to complete valuation case 1 and make a value judgment. The valuation judgment is captured as point estimate (per acre and total). This valuation case represents the pretest and yields the first observation or measure. The entire measurement instrument is discussed in section 3.5 (construct validity). After completion of the first valuation case, subjects in the treatment groups receive their treatment. Subsequently, subjects of all groups, including the posttest-only validity control group, are given a second valuation case of an unrelated property (See

Appendix B). After completion of this case, subjects are asked to provide their second value estimate (second measure) as point estimate and range. The experiment is concluded with an exit questionnaire (Appendix C).

Validity represents the best approximation of the truth for a given conclusion. Four types of validity are used to judge the quality of research: internal validity, external validity, construct validity and (statistical) conclusion validity. (Trochim and Donnelly, 2008) For the remainder of this chapter, these different validity types represent the outline for the discussion of my research design (internal, external and construct validity) and analysis of the experimental data (conclusion validity).

3.3 Internal validity and causality

Internal validity refers to the strength of inferences about the causal or cause-effect relationship between variables. (Trochim and Donnelly, 2008) The purpose of this study is the analysis of the causal relationship between market feedback and valuation judgment. Thus, internal validity is a crucial consideration for the experimental design. To assess whether the treatment had an effect on (caused) the outcome, alternative explanations (confounding effects) have to be eliminated. The advantage of experiments is that alternative explanations can be controlled for and one particular causal relationship can be isolated.

3.3.1 Treatment

The transaction price feedback treatment used to test the hypothesized causal relationship in a depressed market is based on Hansz (1999). Neither the treatment nor the valuation cases include any information about real estate market trends. The transaction price feedback is administered in form of the following hand-written note from the seller's broker. This treatment is adapted from Hansz (1999).

"The 1 acre site known as 239 Devonwood Drive in Sandy Springs sold on October 17, 2011 for $ ..... per acre. This sale was considered to be a market value transaction of the fee simple estate. The site was purchased by Ruth and Wesley Watkins. The grantees financed the purchase with a 30-year fixed rate mortgage at current market interest rates."

In line with Hansz (1999), the transaction prices to be entered in the sales report represent a 15% decrease ("too high") and +15% increase ("too low") from the individual appraiser's estimate for valuation case 1. Although larger deviations may reflect the total loss in home values since the height of the housing market in 2007 more appropriately, average house prices in the Portland MSA in September 2011 were only 5.7% lower than September 2010 prices (Case-Shiller Index). A 15% range around the estimates for valuation case 1 is considered appropriate for the experimental manipulation. A larger range, say 25%, could be considered unrealistic or out of context by experimental subjects and thus fail to be a powerful manipulation, particularly for the "too low" feedback group. The treatment is administered as follows: While subjects are working on the first valuation case, the experimenter sitting opposite the subjects is working on a laptop and hiding a notepad with the seller's broker note from the subject's view. In the note, the per-acre sales price is left blank. While the subjects write down their per acre

estimate for the first case, the experimenter uses the calculator on the laptop to calculate the treatment transaction price. This procedure ensures that the amount used in the treatment is exactly 15% above or below the subject's estimate for the first valuation case. The experimenter then enters the calculated amount into the hand-written note. This procedure aims at ensuring that subjects do not notice the manipulation, i.e. calculation of and entering of the number into the broker's note. Before the second case is handed to subjects, the experimenter provides subjects with the note identifying it as information on the property they just valued.

3.3.2 Manipulation checks

This study includes two manipulation checks. The purpose of manipulation checks is to assess whether the experimental manipulation has worked. (Fromkin and Streufert, 1976) Manipulation checks help in the interpretation of findings, particularly insignificant ones. If an experiment yields insignificant results, manipulation checks can help decide whether this insignificance is due to the absence of a hypothesized relationship or the non-reception of the experimental treatment by subjects.

The implicit manipulation in the experiment are real estate market conditions: The findings of Hansz (1999) and Hansz and Diaz (2001) suggest that experimental subjects subconsciously introduced current real estate market conditions into the experiment (e.g. optimism and client expectations) leading to the upward bias. The experiment in hand is conducted in the metro Portland area from October to December 2011. At the time of this study, the housing market in Portland had been experiencing depressed conditions. The average home prices in Portland continued to fall in 2011 and values dropped by 30.6% since the market peak in 2007, which represents a higher loss than the national average of

29.5%. (Manning, 2011) In the second quarter of 2011, foreclosures accounted for 33% of all sales in Oregon, placing the state at position 9 in the national ranking of foreclosure sales (by percentage and state; Njus, 2011). To test whether subjects are experiencing depressed housing market conditions I use a manipulation check. The following question is included in the final questionnaire: *"Overall, in what phase of the market cycle do you think the housing market in the metro Portland area is currently in?"* Subjects can choose between the answers: (1) "upward-trending", (2) "boom", (3) "downward-trending", (4) "bottom" or (5) "not sure". If experimental subjects are currently experiencing negative real estate market conditions, I expect the mean answer to this question to be high, i.e. somewhere between 3 and 4 assuming that subjects who answered (5) are excluded from the mean calculation.

I also include a second manipulation check: As discussed in chapter 2 and Hansz and Diaz (2001), outcome feedback has been found to increase confidence and reduce uncertainty. A second manipulation check tests whether the provided feedback makes subjects in the treatment groups more confident about their value judgment. The following question in the final questionnaire, to be completed by subjects after the second valuation case, tests for this effect of the manipulation: "*Do you feel confident about your value estimate*?". Subjects are asked to rate their confidence for each valuation case and are given a 5-point Likert scale ranging from 1 (not at all confident) to 5 (very confident). This manipulation check is adapted from Hansz (1999). If market feedback (transaction price) results in higher confidence, I expect the mean change in confidence between cases for the treatment groups to differ from the ones for the control groups (be higher) and less variance in the second valuation case estimates for the treatment groups.

3.3.3 Threats to internal validity

A number of threats to internal validity exist. (Trochim and Donnelly, 2008; Cook and Campbell, 1976) In a pre-posttest experiment introducing a pre-posttest control group into the experimental design can eliminate single group threats, such as the history, maturity and instrumentation threat. As a consequence, a pre-posttest no-feedback control group complements the market feedback treatment groups in the experimental design. As treatment and control group face the same issues (e.g. maturity, regression to the mean), any difference between these groups is the result of the experimental manipulation. The testing threat to internal validity, i.e. taking the test affects how subjects score on pre and post-test (Trochim and Donnelly, 2008), is addressed by implementing a posttest-only (validity) control group analogously to Hansz (1999) and Hansz and Diaz (2001). A significant difference in the value estimates for the second valuation case of pre-posttest control group and posttest-only control group would indicate a testing bias. The resulting hypotheses for the testing bias are H_0: VC=NF and H_A: VC≠NF, where VC is the mean estimate for the second valuation case of the posttest-only control group (validity control) and NF is the mean estimate for the second valuation case of the pre-posttest control group ("no feedback" group). If the null hypothesis cannot be rejected, no testing bias is present.

At the multi-group level, selection bias and its various forms represent a serious threat to internal validity. It is the result of any pre-treatment differences between groups and leads to post-treatment difference that are not the result of experimental manipulation. (Trochim and Donnelly, 2008; Cook and Campbell, 1976) Selection bias is eliminated by randomly assigning subjects to the different groups. As shown in Table 3, the random

assignment occurs before the pretest. The random assignment is implemented as follows: In preparation for the experiment, the names of all subjects, identified as discussed in section 3.4, are entered into a MS Excel spreadsheet. Each of the four experimental groups is assigned a number from 1 to 4 (1=too low, 2=too high, 3= pre-posttest control, 4= validity control). The RandBetween function in Excel is then used to assign a number between 1 and 4 to each subject, reflecting the respective groups.

Social interaction threats as discussed in Trochim and Donnelly (2008) and Cook and Campbell (1976) are not considered relevant with regard to the experimental design. However, to avoid the diffusion of treatment, appraisers who take the experiment at the same time in the same location and who are likely assigned to different groups are not allowed to communicate with each other during the experiment.

3.4 External validity and sample selection

3.4.1 Sampling frame and sample size

External validity refers to the degree to which the findings of a study can be generalized to other individuals in other times and places. (Trochim and Donelly, 2008; Cook and Campbell, 1976) One goal of this study is to obtain conclusions that are generalizable to residential real estate appraisers, which is the population of interest. In this context, the theoretical and accessible populations have to be distinguished (Trochim and Donelly, 2008): The theoretical population is comprised of all practicing residential real estate appraisers in the US while the accessible population comprises of all practicing residential real estate appraisers in the metro Portland area. The sampling frame for this study consists of all currently practicing residential real estate appraisers in the metro Portland area, who are Oregon State certified residential appraisers. The Portland

Metropolitan Statistical Area (MSA) consists of the counties Clackamas, Columbia, Multnomah, Yamhill and Washington in Oregon and the counties Clark and Skamania in Washington.

In line with the majority of previous behavioral real estate studies (e.g. Diaz and Hansz, 2001; Hansz and Diaz, 2001; Diaz and Hansz, 1997), I use expert subjects instead of student subjects as expert and non-expert subjects may behave differently. (Diaz, 1990) Using expert appraisers yields a higher degree of generalizability of findings to the theoretical population of interest. In line with previous studies (e.g. Tidwell, 2011; Hansz and Diaz, 2001) I assign 10 subject to each group, resulting in a total sample size of 40. This number of observations per cell represents a trade-off between sufficient statistical power and the feasibility of the experiment.

3.4.2 Participant selection and acquisition

To eliminate potential threats to external validity (for an in-depth discussion, see Cook and Campbell, 1976), I randomly select subjects to be included in my sample. I obtain a list of all certified residential appraisers in the State of Oregon, who are registered in the Portland MSA from the Oregon Appraiser Certification and Licensure Board (OACLB; total: 314). Only active certified residential appraisers are used. Using MS Excel, I assign a number to each appraiser and use the RandBetween function to select forty MAI appraisers (10 observations per cell). In a next step, I contact individual appraisers by email and/or phone to inquire about availability to participate in the study. The participant acquisition took place over the period of October to November 2011. If contacted appraisers agreed to participate, I set up a meeting to conduct the experiment. As most residential appraisers work out of their homes, I conducted the majority of

experiments in coffee shops. A few appraisers asked me to meet them in their home and/or office. If selected certified residential appraisers declined to participate, the above random selection was repeated to determine a replacement. In order to obtain 40 participants for the main experiment and 6 for the pilot study, 253 appraisers were contacted, which translates into a response rate of 18.2%. The majority of contacted appraisers did not respond to emails or voice messages, even after repeated attempts. Appraisers who were reached but declined participation predominantly named four reasons: Some appraisers named "not interested" as reason while others declined because their current work schedule didn't allow any time to meet with me ("busy"). At the time my experiments were conducted, interest rates were very low and resulted in an increase of refinancing-related valuations. Additionally, the reductions in appraisal fees and increases in valuation requirements by AMCs increased the workload of appraisers significantly and reduced their availability to participate. A smaller amount of appraisers felt uncomfortable with vacant land appraisals, either due to their inexperience or the inadequacy of data currently experienced in the Portland MSA. Even after explaining to them that the experimental cases are simplified and contain all the information needed, they were still reluctant to get involved with anything related to land valuation.

3.5 Construct validity and operationalization

Construct validity represents the degree to which the operationalization reflects the theoretical construct (ideal). Operationalization refers to the program or measurement instrument used. This type of validity is concerned with the generalizability from the operational program or measures to the underlying concept of the measures. The central questions of construct validity are: Does the implemented instrument measure what it is supposed to measure? How well does the actual measures reflect the underlying theory? (Trochim and Donnelly, 2008)

3.5.1 Measurement instrument

The measurement instrument consists of two valuation cases of vacant residential land in Georgia, which for simplicity reasons require subjects to only use the sales comparison approach (i.e. weighing comparable sales). Subjects took on average 20 to 50 minutes to complete both valuation cases. Following the majority of existing behavioral real estate literature (see Chapter 2), the valuation cases in this experiment are set in a geographically unfamiliar location: Appraisers from the metro Portland area (see section 3.4) are asked to value vacant properties in the metro Atlanta area in Georgia. Valuing properties in geographically unfamiliar locations increases uncertainty and complexity for subjects and is more likely to increase the effect of market feedback on value judgments. Additionally, valuation cases set in geographically familiar locations may introduce confounding effects: Experimental subjects have varying experience in geographical submarkets in the metro Portland area. For example, some appraisers are very active in the Lake Oswego (South-West Portland) while others may be predominantly active in East or North Portland. If an experimental case was set in Lake

Oswego, more familiar appraisers may introduce additional knowledge about the area and subject property into the experiment, which represents a threat to internal validity. Valuation cases set in unfamiliar geographical locations eliminate potential confounding effects due to varying area expertise of experimental subjects. However, to ensure that none of the subjects is familiar with this geographical market, appraisers are asked about their familiarity with the Georgia housing market in the final questionnaire. None of the experimental subjects had ever done an appraisal in the metro Atlanta area.

Valuation cases 1 and 2 are adapted from Hansz (1999). Each of the valuation cases consists of a problem statement, identification of the subject property, purpose of the appraisal, neighborhood data, property data and five comparables. No housing market information is provided in the valuation cases. The subject properties are located in Sandy Springs in Fulton County, GA (valuation case 1) and Newnan in the neighboring Coweta County, GA (valuation case 2). The Sandy Springs subject property has a size of 0.42 acre and the Newnan subject property of 0.2 acre. The selection of unrelated properties in two neighboring counties is in line with Hansz (1999). As the experiment in hand is laboratory, the comparable sales in the two valuation cases are hypothetical. Initially, the prices per unit ($ per acre) for all comparable sales are taken from Hansz (1999) and increased by $200,000. The size of subject and comparable properties is chosen to reflect representative residential lot sizes. Sales prices are determined by multiplying the (modified) price per acre with the new lot sizes. In line with Hansz (1999), sales prices and dates are selected to eliminate any price trend in consecutive sales. In this first stage, the transaction dates of the comparable sales are also taken from

Hansz (1999) and updated by changing the years to 2010 and 2011 respectively. Subject property and comps in both cases have the same zoning and utilities in place.

3.5.2 Pilot study

Although the measurement instrument is partially adapted from Hansz (1999), a pilot study was conducted to assess potential threats to construct validity and ensure the reliability of the measurement instrument. This smaller scale experiment was used to fine-tune the measurement instrument before conducting the main experiment with the full sample of certified residential appraisers. The pilot study was conducted in the first two weeks of October 2011. At the time of the pilot study, no valuation class was offered at Portland State University or any of the other organizations offering appraiser education in the Portland MSA. Thus, valuation students could not be used for the pilot, as previously done by Tidwell (2011) or Hansz (1999). Instead the pilot study was conducted with six expert appraisers. First, four appraisers were assigned to each of the four experimental groups. While the answers of pilot subjects to the first valuation case showed some variability, all subjects gave exactly the same estimate for the second valuation case (no variability). After discovering this problem, two additional expert appraisers were asked to conduct both valuations, which yielded the same result. Pilot study subjects were then asked how they arrived at the estimate for the second case. The conclusion was that all subjects simply averaged the five comps sales prices, as they were relatively close in value. As a consequence, the experimental cases were revised as follows: The differences between comparable sales were increased to avoid the valuation approach pilot study subjects took. Consequently, comps vary widely and require main experiment subjects to thoroughly evaluate the features of comps against features of the

subject property. Increasing the discrepancy of comps transaction prices didn't reduce their credibility as, according to experimental subjects, the vacant residential land market at the time of the experiments showed similar characteristics (i.e. sales prices were "all over the place"). In addition to the sales prices (total and per acre), the dates of the comps were also changed from the initial ones (see 3.5.1). Analogously to Hansz (1999), the revised comps of both valuation cases did not show a trend. Table 4 presents an overview of the subject properties and final comparables sales for both valuation cases (for more information, see Appendix A and B). The valuation date is October 15, 2011.

Table 4: Overview of Subject Property and Comparable Sales

Valuation case	Property	Size (in acres)	Sales Date	Sales Price (total)	Sales Price (per acre)
1 (Fulton County)	*Subject*	*0.42*			
	Comp 1	0.93	12/30/2010	$277,280	$298,150
	Comp 2	0.39	02/17/2011	$159,705	$409,500
	Comp 3	0.58	07/06/2011	$223,892	$386,020
	Comp 4	0.65	09/05/2011	$293,345	$451,300
	Comp 5	0.48	10/01/2011	$149,174	$310,780
2 (Coweta County)	*Subject*	*0.2*			
	Comp 1	0.63	02/01/2011	$186,606	$296,200
	Comp 2	0.2	08/18/2011	$82,140	$410,700
	Comp 3	0.26	09/10/2011	$58,690	$225,731
	Comp 4	0.37	03/07/2011	$135,957	$367,450
	Comp 5	0.18	07/30/2011	$57,657	$320,316

3.5.3 Threats to construct validity

Of the threats to construct validity as discussed in Trochim and Donnelly (2008) and Cook and Campbell (1976), the following issues are considered most threatening to the quality of this study and are addressed in the experimental design or administration of the experiment. The experimenter can't control for all possible experiences of subjects, external to the experiment, which may interact with the experimental treatment. (Trochim and Donnelly, 2008) Thus, I address this potential threat by means of the pre-posttest control group. Control and treatment groups are exposed to the same real estate market conditions. Any difference between treatment and control groups is due to the experimental treatment. Social threats to construct validity (Trochim and Donnelly, 2008; Cook and Campbell, 1976) are considered minor for this study. Subject may be tempted to guess hypotheses and base their behavior on these guesses, not the treatment. Thus, the experimental outcome may be rather the result of guessing than treatment. (Trochim and Donnelly, 2008) To address this threat, I provide them with general explanations about the purpose of this research (investigation into the decision-making behavior of residential appraisers). After completing the experiment, subjects were informed about the background of the study and the research hypotheses. Evaluation apprehension, i.e. evaluation-induced anxieties, is considered no threat as firstly the valuation cases used in the experiment are relatively simple and secondly expert appraisers are asked to complete a common professional task (valuation). As a consequence, the questionnaire with demographic and professional questions is placed at the end of the second valuation case instead of at the beginning of the experiment as in Hansz (1999). Placing this questionnaire at the end also allows hiding the two manipulation checks better to avoid that subjects recognize them as manipulation checks. Lastly, to reduce potential biases

from the influence of the experimenter on the subjects (experimenter expectancies), all subjects are provided with the same written explanations in the valuation cases (e.g. objective of valuation). If subjects have case-related questions during the experiment, the experimenter provided an answer as long as it only served to clarify provided information.

3.6 Conclusion validity and statistical analysis

Conclusion validity or statistical conclusion validity is important not for the design of an experiment, but the analysis of experimental data. It refers to the degree to which conclusions or inferences made from the experimental data are credible and reasonable. (Trochim and Donnelly, 2008) While internal validity is concerned with systematic bias and whether a relationship is causal, conclusion validity focuses on sources of error variance and the appropriate use of statistical tests. (Cook and Campbell, 1976)

3.6.1 Diagnostics and assumption testing

To test my hypotheses as shown in Table 1, I analyze my experimental data with parametric and non-parametric tests such as the independent sample t-test and the Mann-Whitney U test. Parametric tests are more powerful, however, they are based on the assumption of a normally distributed population. As postulated by the Central Limit Theorem (CLT), the sampling distribution of a statistic (e.g. mean) approaches normality, regardless of the distribution of the underlying population, if the sample size is sufficiently large. While a sample size of 30 is commonly used as guideline, it is questionable whether this sample size is sufficiently large to automatically assume normality. To determine a sufficiently large sample size, characteristics such as the shape of a distribution (e.g. skewness and kurtosis) have to be considered. To eliminate the

threat of violated assumptions of statistical tests (Trochim and Donnelly, 2008), I use visual and quantitative data diagnostics to test for normality. I use histograms and Q-Q plots as visual diagnostic tools and a number of quantitative tests to assess normality. The quantitative tests include the Jarque-Bera (JB) test, the Kolmogorov-Smirnov (KS) test, the Shapiro-Wilk (SW) test and the Anderson-Darling (AD) test.

Equality of variance between the groups is another assumption of the parametric t-test. The Levene's test for equality of variances is used to quantitatively test whether the equal variance assumption is violated. In this study, the null hypothesis of the Levene's test is that variances between experimental groups are equal.

3.6.2 Hypothesis testing using independent samples t-test

If the data are normally distributed and of equal variance, I use the parametric independent samples t-test (Student's t-test) to test the hypotheses as shown in Table 1. The t-test is chosen for simplicity, however, a one-way analysis of variance (ANOVA) or multiple ordinary least square regression would yield the same results. (Trochim and Donnelly, 2008) The t-statistic is calculated as shown in equation 1. Hypothesis RH_{1a} requires a two-tailed t-test, while hypothesis RH_{1b} requires a one-tailed t-test.

$$t_{df} = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}\right)}} \quad \textbf{(1)}$$

Where $\bar{x}_n$ represents the sample mean of an experimental group, s_n^2 represents the group variance and n_n represents the group sample size. The degrees of freedom equal the sum of both groups minus 2. (Trochim and Donnelly, 2008)

3.6.3 Threats to conclusion validity

In my analysis, I reduce threats to conclusion validity in two ways. The type I error, i.e. incorrectly rejecting the null hypothesis, represents one threat (Trochim and Donnelly, 2008) and is mitigated by choosing a significance level of 5%. This translates into a critical t-statistic of ± 1.96 for the two-tailed hypothesis ($RH1_a$) and 1.645 for the one-tailed hypothesis (RH_{1b}) as it implies an upper tail test. The resulting decision rule for the two-tailed test is: If $|t_{observed}| \geq |t_{critical}|$, reject H_0, if not, do not reject H_0. The decision rule for the one-tailed test is: If $t_{observed} \geq t_{critical}$, reject H_0; if not, do not reject H_0. To address the threat of the "fishing and (type 1) error rate problem" ("bouncing alphas"; Trochim and Donnelly, 2008; Shadish, Cook and Campbell, 2002) due to two separate sub-testing hypotheses for research hypothesis 1, I combine the testing hypotheses into one as shown in Table 2. I then use a one-way analysis of variance (ANOVA) F-test to test for differences in means between the different groups. The experimental design (e.g. random sampling, distinct groups, same sample sizes) ensures that the assumptions of an ANOVA, such as equal variances and normality, are satisfied by the experimental data. The basic idea of the ANOVA F-test is a comparison of the variance between experimental groups and the variance within these groups as shown in equation 2. The between and within group variances are calculated as shown in equations 3 and 4. If an experimental treatment has an effect, the group means would be different and the between group variation would exceed the within group variation.

$$F - statistic = \frac{s^2_{betweengroups}}{s^2_{withingroups}} \quad \textbf{(2)}$$

$$s^2_{betweengroups} = \frac{n_i \sum (\bar{x}_i - \bar{x})^2}{k-1} \quad \textbf{(3)}$$

$$s^2_{withingroups} = \frac{\sum\sum (x_{ij} - \bar{x})^2}{n-k} \quad \textbf{(4)}$$

Where $\bar{x}_i$ is the sample mean of group i, $\bar{x}$ is the mean for the total sample, n_i is the sample size of group i, k is the number of groups, n is the total sample size and x_{ij} is the j^{th} observation in group i. The respective degrees of freedom are (k-1) and (n-k). The F-statistic follows the F-distribution and the critical F-statistic for a given level of the type I error, in this study 5%, is derived from the respective table. If the observed F-statistic as calculated in equation 2 exceeds the critical F-statistic, the null hypothesis can be rejected. However, while ANOVA allows testing for differences in multiple means, it does not allow any judgments about which group mean specifically differs and caused rejection of the null hypothesis. (Field, 2005)

Low statistical power, i.e. incorrectly failing to reject (accept) the null hypothesis (high type II error), represents an additional threat (Trochim and Donnelly, 2008; Cook and Campbell, 1976). Statistical power is defined as (1-type II error) and represents the ability to correctly reject the null hypothesis, i.e. finding a relationship in the experimental data that indeed exists in reality. For insignificant results I conduct a power analysis (for an in-depth discussion, see Cohen et al., 2003 and Field 2005). To assess the statistical power of my t-tests I convert the t-statistic into an effect size, r, as shown in equation 5. (Field, 2005) The post-hoc power of my t-tests is then calculated with the program G*Power. (For more information, see Erdfelder, Faul and Buchner, 1996)

$$r = \sqrt{\frac{t^2}{t^2 + df}} \quad \textbf{(5)}$$

3.6.4 Non-parametric robustness checks

As robustness check for the parametric t-test, due to the small sample size and in case the diagnostics reveal a non-normal distribution in the experimental data. I use the Mann-Whitney U test. This test compares the medians of two groups. It is based on an ordering of scores and the assignment of ranks equal to their relative position in the ordered sequence. (Field, 2005) The U-statistic for both groups is then calculated as shown in equation 6.

$$U = n_1 n_2 + \frac{n_1(n_1 + 1)}{2} - R_n \quad \textbf{(6)}$$

Where n_n is the sample size of the respective groups and R_n is the sum of ranks for either group 1 or 2. Significance of the smaller U-statistic is then determined based on the respective table or computer program.

4 RESULTS

This chapter presents the results of the empirical investigation of this study. After an overview of the characteristics of experimental subjects, descriptive statistics are provided. The third section presents the results of the research hypotheses testing using the parametric t-test. It is followed by robustness checks, an analysis of manipulation checks and a power analysis.

4.1 Experimental subject profile

As show in Table 5, the majority of appraisers who participated in this study is male (77.5%). On average, they are 51 years old and had 20 years of experience in residential appraisal. The minimum age in the sample is 28 and the maximum 70 years. Experience ranges from 5 to 47 years. The majority of subjects has a bachelor degree or higher (65%). Residential real estate valuation represents on average 97% of their work (minimum: 70%; maximum: 100%) and 45% of participants hold designations or certifications in addition to being an Oregon State certified residential appraiser. These appraisal designations or certifications include the Senior Residential Appraiser (SRA) by the Appraisal Institute, Federal Housing Administration (FHA) certification, the Independent Fee Appraiser (IFA) certification by the National Association of Independent Fee Appraisers (NAIFA) and the Veterans Affairs (VA) certification.

Table 5: Full Sample Profile		
Gender	*Male*	77.5%
	Female	22.5%
Age (in years)		50.7
Experience (in years)		20
Education	*High school*	2.5%
	Some college	32.5%
	Bachelor degree	45%
	Graduate degree	20%
Share of residential valuation		97%
Share of appraisers with additional certifications/designations		45%

Table 6 presents subject profiles by experimental group. With exception of the "too high" feedback group, the majority of appraisers in all groups is male. Subjects in the "too low" feedback group are on average 45.3 years old and had 16 years of experience. Subject age in this group ranges from 32 to 56 years and experience from 6 to 30 years. The majority of subjects (70%) has a bachelor degree or higher and only 20% have an additional certification or designation. On average, subjects derive 97% of their work from residential appraisal (minimum: 70%; maximum: 100%).

In the "too high" feedback group, the age of subjects ranges from 39 to 67 years, averaging 48.6 years. Appraisers in this group have on average 16.7 years experience in residential appraisal, with a minimum of 8 and a maximum of 26 years. 80% of this group's subjects hold a bachelor degree or higher and 50% hold additional certifications or designations. On average 98.5% of subject's work is in residential real estate valuation (minimum: 95%; maximum: 100%).

Appraisers in the control group, which received no feedback, are on average 56.5 years old, with a minimum of 28 and a maximum of 66 years. Their experience ranges from 10 to 42 years with an average of 26.20 years. 60% of subjects have a bachelor degree or higher and 70% hold additional appraisal certifications or designations. On average, 97% of subjects' work is in residential valuation (minimum: 70%; maximum: 100%).

Lastly, subjects in the validity control group are on average 52.4 years old with a minimum of 35 and a maximum of 70 years. Residential appraisal experience ranges from 5 to 47 years, averaging at 21.10 years. In this group, half of all appraisers holds a bachelor degree or higher and 40% has additional appraisal certifications or designations. Appraisers in this group derive on average 95.5% of their work from residential appraisal (minimum: 80%; maximum: 100%).

Table 6: Experimental Group Profiles

		Too low feedback	**Too high feedback**	**No feedback**	**Validity control**
Gender	*Male*	100%	40%	70%	100%
	Female	0%	60%	30%	0%
Age (in years)		45.3	48.6	56.5	52.4
Experience (in years)		16	16.7	26.2	21.10
Education	*High school*	0%	0%	0%	10%
	Some college	30%	20%	40%	40%
	Bachelor degree	50%	60%	40%	30%
	Graduate degree	20%	20%	20%	20%
Share of residential valuation		97%	98.5%	97%	95.5%
Share of appraisers with additional certifications/designations		20%	50%	70%	40%

In conclusion, the sample profile for the full sample (N=40) and the individual experimental groups (observations per cell: 10) show that residential appraisers who participated in this study are predominantly middle-aged, very experienced, educated and male.

Reflecting the changes in the residential appraisal task environment as discussed in section 2.2, AMCs represent the most important client group (full sample: 62.2%). As shown in Table 7, the increased importance of AMCs to the individual appraiser's business is also evident in the experimental groups. Some mortgage lenders, such as local banks or credit unions, are not required to use AMCs as intermediaries as they don't sell mortgages to secondary mortgage market entities such as Fannie Mae. These local lenders are the second most important source of work for appraisers (17.9%), followed by governmental agencies such as FHA or VA (7.5%), other clients such as attorneys (7.2%) and individual homeowners/sellers (5.2%).

However, these sample frequencies hide the stark difference in sources of business among subjects: In the full sample, the share of AMC work in an individual appraiser's business ranges from 0% to 100% (mortgage lenders: 0-93%; individual homebuyers/sellers: 0-50%; governmental agencies: 0-100%; other clients: 0-80%). Appraisers with different clients face different working conditions. For example, most AMCs require appraisers to bid for assignments against other appraisers, complete assignments within 48 hours after inspection of the property, use comps within the last three months (at the most the last six months) and use comps within a certain distance from the subject property. None of the appraisers predominantly working for governmental agencies or attorneys mentioned such restrictions on their work and fees.

Table 7: Appraisal Client Profile					
	Full sample	**Too low feedback**	**Too high feedback**	**No feedback**	**Validity control**
Mortgage lenders	17.9%	14.6%	18.7%	14%	24.3%
Individual homebuyers/sellers	5.2%	2.7%	9.7%	4.7%	3.8%
AMC	62.2%	71.5%	60.8%	61.3%	55.2%
Governmental agencies	7.5%	2.7%	5%	6%	16.2%
Other	7.2%	8.5%	5.8%	14%	0.5%

4.2 Descriptive statistics and diagnostics

In preparation for hypotheses testing using the independent samples t-test, the properties of the experimental dataset are investigated to assess whether the assumptions of normality and equal variances have been violated. Table 8 and Table 9 present an overview of descriptive statistics across experimental groups for the first and second valuation case respectively.

Table 8: Descriptive Statistics (Valuation Case 1)			
	Too low feedback	**Too high feedback**	**No feedback**
Mean	$167,210	$160,334	$154,792
Median	$164,064	$157,500	$152,341
Standard deviation	$22,169	$16,448	$15,184
Minimum	$134,776	$130,200	$132,510
Maximum	$208,250	$192,000	$180,000
Range	$73,474	$61,800	$47,490

Table 9: Descriptive Statistics (Valuation Case 2)				
	Too low feedback	**Too high feedback**	**No feedback**	**Validity control**
Mean	$75,069	$72,034	$69,009	$75,393
Median	$77,500	$76,000	$66,481	$77,500
Standard deviation	$8,075	$12,775	$7,629	$7,193
Minimum	$58,800	$45,000	$60,000	$63,469
Maximum	$84,624	$85,000	$82,000	$82,140
Range	$25,824	$40,000	$22,000	$18,671

The parametric independent samples t-test requires normality and equality of variances between groups (see section 3.6.1.1). As a starting point, Table 10 presents the moments of the distribution derived from value estimates for the second valuation case for all experimental groups (full sample). The first moment is $72,876. The third and fourth moment suggest that the distribution is not normal. The dataset is negatively skewed (-0.795), which indicates a left tail with the majority of data to the right of the mean. A kurtosis of 0.344 suggests that the sample data distribution has a steeper peak than the normal distribution.

Table 10: Moments of Distribution (Valuation Case 2)

Mean	$72,876
Standard Deviation	$9,217
Skewness	-0.795
Kurtosis	0.344
N	40

The histogram in Figure 1 visually shows that the data are not normally distributed: At the end of the left tail appears to be an outlier, however, this value estimate belongs to the "too high" feedback group and is likely the result of experimental manipulation. Additionally, the distribution appears to be almost bimodal. Figure 2 presents the Q-Q plots for the full sample. These plots also show that the data deviates from normality. The detrended normal Q-Q plot shows two outliers (low outlier: too high feedback group; high outlier: control group), which were subsequently double-checked for incorrect data entry. However, in both cases no recording error is responsible for these outliers.

In a next step, quantitative diagnostic tools are used to assess normality. The results are shown in Table 13. The results are mixed. While the KS and JB test suggest that there is no reason to expect that the data be not from a normal distribution, the SW and AD test suggest the opposite.

The research hypotheses 1_a and 1_b are tested based on the difference between the value estimates for valuation case one and two (in the following: DIFFVAL). As DIFFVAL for each subject is negative, it is multiplied by (-1). The DIFFVAL data are additionally analyzed to assess whether the normality assumption holds. As the two treatment groups and pre-posttest control group have two measures, only 30 data points exist. Table 11 presents the descriptive statistics of DIFFVAL for each experimental group.

Table 11: Descriptive Statistics (DIFFVAL)

	Too low feedback	**Too high feedback**	**No feedback**
Mean	$92,141	$88,300	$85,783
Median	$86,600	$86,400	$86,750
Standard deviation	$23,259	$15,521	$19,114
Minimum	$70,713	$69,118	$55,322
Maximum	$142,447	$110,000	$120,000
Range	$71,734	$40,882	$64,678

The moments of distribution for DIFFVAL are shown in Table 12. The third and fourth moments suggest that the distribution is not symmetric, i.e. has a positive skew, and has a steeper peak than the normal distribution.

Table 12: Moments of Distribution (DIFFVAL)

Mean	$88,741
Standard Deviation	$19,055
Skewness	0.877
Kurtosis	1.007
N	30

The histogram in Figure 3 visualizes the distribution with its longer right tail (right skew) and pointy peak. However, compared to the histogram of the estimates for the second valuation case (Figure 1), this distribution resembles the normal distribution to a higher degree. The Q-Q plots in Figure 4 suggest that the distribution of DIFFVAL estimates doesn't follow the normal distribution perfectly. The four normality tests for the DIFFVAL data were conducted and the results are shown in Table 13. The tests unanimously suggest that no reason exists to expect the DIFFVAL data are not from a normal distribution.

The results of the Levene's test for equality of variance are shown in Table 13. The test compares the variance of each experimental group with the variance of the other three groups. None of the Levene's test F-statistics is significant at the 5% level. Thus, the null hypothesis of equality of variances cannot be rejected.

Table 13: Quantitative Diagnostic Tests

	Diagnostic tool	**Test-statistic**	**Conclusion**
Normality (Valuation case 2; N=40)			
	JB test	3.941	Fail to reject normality
	KS test	1.298	Fail to reject normality
	SW test	0.904*	Reject normality
	AD test	1.304*	Reject normality
Normality (DIFFVAL; N=30)			
	JB test	4	Fail to reject normality
	KS test	0.801	Fail to reject normality
	SW test	0.947	Fail to reject normality
	AD test	0.562	Fail to reject normality
Equality of variances (Levene's test)			
	$TPF_{too\ low}$ & NF	0.00	Fail to reject equality of variances
	$TPF_{too\ high}$ & NF	1.910	Fail to reject equality of variances
	$TPF_{too\ high}$ & $TPF_{too\ low}$	1.749	Fail to reject equality of variances
	NF & VC	0.008	Fail to reject equality of variances
	$TPF_{too\ low}$ & VC	0.006	Fail to reject equality of variances
	$TPF_{too\ high}$ & VC	2.202	Fail to reject equality of variances

*Note: In the above table, (V2-V1) represents the difference between the value estimates for each case for each subject. The equality of variances (Levene's test) is based on the value estimates for the second valuation case. In the table above, $TPF_{too\ low}$ is the "too low"feedback group, $TPF_{too\ high}$ is the "too high" feedback group, NF is the "no feedback" group and VC is the posttest-only validity control group. * denotes significance at the 5% level*

In conclusion, the diagnostics show that the assumptions of parametric tests such as the independent samples t-test and one-way ANOVA are not violated by the experimental data. The estimate difference between the two valuation cases (DIFFVAL) is suggested to follow the normal distribution and the experimental groups have equal variances.

4.3 Hypothesis testing results

The individual group means for valuation case 1 do not differ significantly from each other. This suggests no pre-test differences between groups and no selection threats to internal validity. The following section presents the results of the hypotheses testing using the parametric independent samples t-test.

H_{1a}: Compared to a control group receiving no feedback, residential expert appraisers receiving the feedback that their previous value estimates were "too low" with regard to the realized transaction price don't make higher subsequent value judgments on an unrelated property.

This research hypothesis translates into the following testable hypotheses:

H_0: $DIFFVAL_{too\ low} = DIFFVAL_{NF}$ H_A: $DIFFVAL_{too\ low} \neq DIFFVAL_{NF}$

Where $DIFFVAL_{NF}$ and $DIFFVAL_{too\ low}$ represent the mean difference between the value estimates of both valuation cases. As DIFFVAL is a negative number, it was multiplied by (-1).

The mean is $92,141 for the "too low" treatment group and $85,783 for the "no feedback" control group. As shown in Table 14, the resulting t-statistic is 0.668, which is smaller than the critical t-statistic of ± 1.96 (α=0.05) for this two-tailed hypothesis. Thus, the null hypothesis cannot be rejected. Subjects in the "too low" experimental treatment

group did not make higher subsequent value judgments than the "no feedback" control group. This finding is in line with the research hypothesis 1_a. Using the value estimate for case 2, instead of DIFFVAL, yields the same result.

The second research hypothesis is of main interest to this study:

H_{1b}: Compared to a control group receiving no feedback, residential expert appraisers receiving the feedback that their previous value estimates were "too high" with regard to the realized transaction price make lower subsequent value judgments on an unrelated property.

This translates into the following testable hypotheses:

H_0: $DIFFVAL_{too\ high} \leq DIFFVAL_{NF}$ H_A: $DIFFVAL_{too\ high} > DIFFVAL_{NF}$

Where $DIFFVAL_{NF}$ and $DIFFVAL_{too\ high}$ represent the mean difference between the value estimates for both valuation cases.

The mean is $88,300 for the "too high" treatment group and $85,783 for the control group. The t-statistic for this mean comparison is 0.323 (Table 14), which is below the critical t-statistic of 1.645 for this one-tailed hypothesis. The means of both groups are not significantly different and the null hypothesis cannot be rejected. An analysis based on the V2 data yields the same result. Thus, no evidence is found that "too high" transaction price feedback introduces a downward bias into subsequent value estimates in a depressed market. However, at this point of the analysis, it cannot be determined whether these insignificant findings are the result of an absence of the hypothesized relationship or a failed manipulation or low statistical power. This will be further investigated in section 4.4.

Lastly, Table 14 presents the results of the testing bias analysis. To test for this bias, the following testable hypotheses were formulated:

H_0: VC=NF H_A: VC≠NF

Where VC and NF are the mean value estimates for the second valuation case.

A rejection of the null hypothesis at the 5% level would indicate a testing bias resulting from the pre-posttest design. The mean value estimate for the second valuation case is $69,009 for the "no feedback" control group and $75,393 for the validity control group. The t-statistic is -1.925, which is smaller than the critical statistic of ± 1.96. The null hypothesis cannot be rejected. However, as the difference between observed and critical t-statistic is relatively small, a second test is run with the mean range for the second valuation case. For the second valuation case, appraisers were asked to give a range (highest and lowest value) around the point estimate that they are most comfortable with. The mean range difference for the pre-posttest "no feedback" control group is $27,228 and for the posttest-only validity control group $23,522. The resulting t-statistic is 0.3, which is smaller than the critical t-statistic of ± 1.96 (failure to reject the null hypothesis). Consequently, these two mean range differences for valuation case 2 are not significantly different from each other. It can thus be concluded that no testing bias threatening internal and construct validity is present in the data.

Table 14: Result of Hypothesis Testing				
	RH 1a	**RH 1b**	**Testing bias (point estimate)**	**Testing bias (range)**
Parametric independent sample t-test	0.668	0.323	-1.925	0.30
Table 15: Result of Hypothesis Testing (Robustness Checks)				
ANOVA	0.268			
Non-parametric Mann-Whitney U test	45.00	45.00	29.00	40.5
*Note: The above tables present the t-statistics for the parametric t-test, the F-statistic for the one-way ANOVA and the U-statistic for the non-parametric test. * denotes significance at the 5% level*				

4.4 Robustness checks

4.4.1.1 ANOVA

The results of the one-way ANOVA are reported in Table 15. The F-statistic is 0.268 and thus insignificant at the 5% level. The null hypothesis that the means of the two treatment groups and the control group are equal cannot be rejected. The findings of the one-way ANOVA support the previous findings from the independent samples t-test.

4.4.1.2 Non-parametric test

The non-parametric Mann-Whitney U test is conducted as robustness check. The null-hypothesis is that the medians of the respective experimental groups differ. The results of this test, based on the medians of DIFFVAL for the respective experimental groups, are shown in Table 15. All U-statistics are insignificant at the 5% level. The null hypothesis cannot be rejected for either the research hypotheses or the testing bias hypothesis. The experimental treatment did not lead to differences between the "too high" feedback and "no feedback" control group. The non-parametric Mann-Whitney U test consequently supports the findings from the parametric t-test and one-way ANOVA.

4.4.1.3 Manipulation checks

As discussed in section 3.3.2, manipulation checks were included into the study design. With regard to the previously identified insignificant results, these manipulation checks help to assess whether the insignificance is due to an absence of the hypothesized relationships or a non-reception of the treatment by subjects or low power.

All subjects in the treatment groups were given the seller's broker note with the transaction price feedback before they were provided with the second valuation case. The experimenter made sure that subjects still had access to their "per acre" and total value estimates from the first valuation case so they could compare them with the "per acre" transaction price in the feedback treatment, if needed. The argument that subjects in the treatment groups did not read (receive) the treatment can be rejected.

The effect size for the independent samples t-test provides additional information about the hypothesized relationship. In this context, effect size can be defined as the magnitude of an effect or strength of a relationship between two variables. A non-existent relationship between two variables would imply an effect size of 0. Although effect sizes have to be interpreted in the context of a particular study and particular discipline, distinctions can be made between small effect (r=0.1), a medium effect (r=0.3) and a large effect (r=0.5). (Field, 2005) Based on equation 5, effect sizes for the data are calculated for both research hypotheses and reported in Table 16. These effect sizes represent statistics (based on a particular sample) and do not allow inferences about the effect sizes in the underlying population. Rather, they have to be understood as descriptive statistics and interpreted in combination with inferential statistics. The effect

sizes for both treatment groups are relatively small. The "too low" feedback treatment explains 16% of the total variance in DIFFVAL; the "too high" feedback treatment explains 8%. The "too low" feedback had a stronger effect on subsequent valuation estimates than the "too high" feedback, which differs from the expectation for a depressed housing market. Albeit small, this effect size analysis suggests that the manipulation has worked.

Table 16: Effect Sizes

	RH 1_a	$RH1_b$
Effect size (r)	0.16	0.08

Note: The above effect sizes are based on the respective t-statistics and 18 degrees of freedom. (See equation 5)

In the exit questionnaire, subjects were asked to rate the current market conditions in the metro Portland area. They could choose from the following options: "upward-trending" (1), "boom) (2), "downward-trending" (3), "bottom" (4) and "not sure" (5). Table 17 presents the mean and median ratings per experimental group. Five subjects indicated "not sure". Both statistics suggest that experimental subjects consider the housing market in the metro Portland area to be downward-trending or at the bottom. Subjects did not agree on whether the market is going down further or already hit bottom. However, both phases of the market cycle are characterized by pessimistic market sentiment and are likely to lead to a "depressed market" mindset in appraisers.

A second manipulation check is used to investigate whether the provision of transaction price feedback increases the confidence of treatment group subjects compared to control group subjects. Table 17 shows the mean change in confidence between valuation case 1 and 2 for all groups. While the treatment groups have higher mean changes in confidence,

these means do not differ significantly from the mean confidence change of the "no feedback" group. A number of appraisers commented on the confidence ratings in the exit questionnaire. They mentioned they are either highly confident, given all the information provided in the simplified cases, or are only moderately confident as they would have needed more detailed information to be more confident.

In his dissertation, Hansz (1999) finds that the standard deviation for the second valuation case is lower for the treatment groups compared to the control group. If market feedback reduces uncertainty such a result would be expected. However, the standard deviation for the second valuation case is smaller for the control group compared to the treatment groups. (Table 17) Additionally, the valuation dispersion, measured as standard deviation divided by mean, for valuation case 1 is 11%, which is slightly larger than the 5 to 10% range identified in previous research (Hansz and Diaz, 2001). The valuation dispersion for valuation case 2 is 12.65% suggesting that the experimental manipulation has increased variability and potentially uncertainty. Valuation dispersion and standard deviations for case 2 may suggest that transaction price feedback did not reduce uncertainty, but rather increased it.

Table 17: Manipulation Checks

	Market conditions mean	**Market conditions median**	**Change in confidence**	**Standard deviation (V2)**
"Too low" feedback group	3.14	3	0.55	$8,075
"Too high" feedback group	3.57	4	0.3	$12,775
"No feedback" control group	3.60	4	0.2	$7,629

4.4.1.4 Power analysis

Apart from a non-existing relationship or the non-reception of the treatment, low statistical power can be another reason for the insignificant findings of this study. The previous discussion of effect sizes and manipulation checks suggests subjects responded to the treatment, i.e. transaction price feedback has a small effect on subsequent value judgments. In the following, a power analysis is conducted to analyze whether low statistical power represents a threat to the statistical conclusion validity of this study. To calculate the post-hoc power, the following information is entered into the program G*Power: type of test (means: Difference between two independent means), one-or two-tailed test hypothesis, effect size, sample size per group, Type I error (α). The effect size used in G*Power is based on Cohen's d, which can be calculated in the program by providing the means and standard deviations of groups.

The results in Table 18 show that low statistical power is a serious threat to conclusion validity. For the "too low" hypothesis, the probability of failing to reject a false null hypothesis (type II error=1-power) is 90%. For the "too high" hypothesis this probability is 91%. The power analysis suggests that the insignificant results may be caused by low statistical power, i.e. the inability to detect an effect that actually exists.

Given the identified effect sizes, statistical power could be increased by increasing the sample size and/or increasing the type I error (α). The latter would have the largest effect on power, however, reducing this conclusion validity threat (low power) would result in an increase of another (type I error). Therefore, increasing the type I error probability is not justifiable. Increasing the sample size on the other hand is not feasible, considering

subject acquisition and data collection of 40 subjects took three months. Therefore, no immediate cure exists to the low power problem with regard to the employed statistical tests.

The study in hand represents an extension of Hansz (1999) and Hansz and Diaz (2001). As a consequence, Table 18 compares power and effect sizes of Hansz (1999) to the current study. In Hansz (1999), the null hypothesis for the "too low" research hypothesis was rejected at the 5% level. The effect of the "too low" feedback is relatively large (r=0.44; Cohen's d=0.92). The large effect size in combination with statistical significance suggests that the identified effect also exists in the underlying population. This effect size gives an indication of the effect size to be expected for a downward bias in a depressed market, if the effect also existed in the opposite direction. However, the effect size for the "too high" feedback in this study is only 0.08, which is relatively similar to the effect sizes of the Hansz' (1999) "too high" feedback group and the "too low" feedback group in this study. For these two groups, no effect of transaction price feedback on value judgments was expected. Thus, the small effect size for the "too high" group could be an indication for a non-existing hypothesized relationship.

Table 18: Results Power Analysis

	Residential Appraisers (2011)			Commercial Appraisers (1999)*		
	T-statistic	Effect size	Power	T-statistic	Effect size	Power
"Too low" Hypothesis	0.668	0.16 (Cohen's d: 0.3)	0.1	2.067*	0.44 (Cohen's d: 0.92)	0.63
"Too high" Hypothesis	0.323	0.08 (Cohen's d: 0.14)	0.09	-0.782	0.18 (Cohen's d: 0.35)	0.19

** Based on Hansz (1999); * denotes significance at the 5% level*

5 CONCLUSION

The following chapter concludes this dissertation. The first section discusses the findings while the second section provides an outlook for future research.

5.1 Discussion

In an upward-trending real estate market, transaction price feedback has been found to introduce an upward bias into subsequent valuation judgments. (Hansz and Diaz, 2001) The identified asymmetric bias represents a deviation from the normative expectation that market feedback influences valuation judgments symmetrically. This dissertation revisits the findings of Hansz and Diaz (2001) and extends their study to residential appraisers in a depressed real estate market.

If the upward bias identified by Hansz and Diaz (2001) is the result of rising real estate market conditions, I expect a downward bias in depressed market conditions. In particular, I hypothesize that residential appraisers provided with the feedback that their previous value estimate was too high compared to the realized sales price for this property will make a significantly lower value judgments for a subsequent unrelated property than appraisers without this market feedback. On the other hand, I expect appraisers in the "too low" feedback group to not make higher (or lower) value judgments than the "no feedback" control group.

I use a pre-posttest experimental design with one factor (market feedback) fixed at three levels ("too low", "too high" and "no feedback) to test my hypotheses. In experiments conducted with 40 active Oregon State certified residential appraisers in the Portland MSA from October to December 2011, I find no evidence that "too high" transaction

price feedback has an effect on value judgments. Parametric tests (t-test, ANOVA) and non-parametric tests (Mann-Whitney U test) yield insignificant results. While no difference was expected for the "too low" feedback and the "no feedback" control group, the results for the "too high" feedback group suggest that market feedback doesn't introduce a downward bias into appraisal judgments in a depressed market. Thus, residential appraisers in this study behave as normatively expected.

The insignificant results could be explained in a number of ways: Firstly, experimental subjects may not have read or noticed the treatment. While the experimenter ensured that all subjects read the seller's broker note before proceeding to the second valuation case, residential appraisers may not commonly receive feedback on transactions from brokers and thus may not have responded as strongly as they would have to other providers of feedback (e.g. AMCs, sales information on MLS).

Secondly, low statistical power represents a threat to conclusion validity and could be responsible for the insignificant results. A power analysis confirms the presence of this threat. The analysis revealed that the magnitude of the effect of transaction price feedback on value judgments in the dataset is small. However, low statistical power does not allow any conclusions about the existence of this effect in the underlying population. A larger sample size would be needed to increase statistical power.

Thirdly, the insignificant findings could be the result of an absence of the hypothesized relationship. One of the explanations Hansz and Diaz (2001) provide for their findings is client pressure. In an upward-trending or booming real estate market, clients such as lenders or home sellers are more likely to prefer valuation judgments at the upper end of

the justifiable range. Appraisers, anticipating property values to rise further, responded to this client feedback. Thus, they were more likely to (subconsciously) respond to the "too low" feedback in the experiment. This explanation is in line with the findings of previous client feedback studies, which were conducted in rising real estate markets: Hansz (2004a) finds that client feedback biases commercial appraisers upwardly while Diaz and Hansz (2010) find the same effect for residential appraisers.

However, client-appraiser relationships have changed significantly as a result of the most recent housing crisis. The previously most important client group, mortgage lenders, has been disconnected from residential appraisers. Nowadays, AMCs are predominantly used to get appraisals for lending purposes. (See section 2.2) When asked whether AMCs pressure residential appraisers to deliver a certain value (e.g. a low value estimate in a down-market), experimental subjects in this study had different experiences. Some appraisers confirmed that, compared to the previous situation in the rising market, AMCs do not put appraisers under pressure to validate a certain amount (e.g. pending mortgage amount). Other appraisers argued AMCs indirectly pressure appraisers to arrive at a certain amount as they have a large number of appraisers available in their pool and could easily replace an appraiser for another one that delivers more "suitable" value judgments. However, the overall consent was that AMCs do not pressure residential appraisers to arrive at a certain value estimate. The pressure residential appraisers experience currently is not regarding the amount of the final value estimate. Rather, residential appraisers find themselves pressured by AMCs to charge the lowest fee, have the shortest turnover time and prepare appraisal reports in the manner required by AMCs. In conclusion, the changes to the residential appraisal task environment have resulted in an elimination of

client pressure on value estimates. Contrary to the commercial appraisers in Hansz and Diaz (2001) and the "too low" feedback, residential appraisers in this study do not directly receive "too high" feedback from their clients. Thus, their subconscious reaction to this feedback in the experiment may have been relatively weak resulting in a substantively negligible effect, which suggests a non-existing relationship.

Hansz and Diaz (2001) present optimism and a conservatism bias as additional explanations for their findings. However, the manipulation check revealed that residential appraisers in this study considered the current housing market in the Portland MSA downward-trending or bottoming. Thus, subjects were sufficiently pessimistic. Additionally, the depressed housing market is also likely to make residential appraisers conservative in their appraisals. Anecdotal evidence from subjects supports this conservatism bias explanation. Receiving transaction price feedback may only reduce this bias slightly, if at all. In conclusion, the elimination of direct client feedback to residential appraisers is a likely explanation for an absence of the hypothesized relationship. This in turn may be the primary explanation for the insignificant findings. However, as client-agent-effects are not explicitly tested in this study and statistical power is low, no final conclusion can be drawn.

5.2 Future research

Hansz and Diaz (2001) and this study focus on simple outcome feedback. However, appraisers receive feedback in a number of other ways. These more complex alternative feedback types (e.g. task properties feedback) represent starting points for future research. One source of feedback to appraisers are brokers. Particularly over the last years clients such as lenders have moved towards requiring appraisers to consult with

brokers and/or are using a separate broker's price opinion (BPO) in addition to an appraisal. As brokers are involved in current market transactions, they have an informational advantage to appraisers who rely on past transaction information. This advantage is particularly strong in a depressed market characterized by short-sales and infrequent sales. BPO can be considered task properties feedback providing appraisers with information about market trends (e.g. sales prices). Future research could investigate whether task properties feedback in form of BPOs biases appraisers, whether it changes the weights appraisers place on different information and whether appraisers anchor on BPOs.

Legislation such as the HVCC has changed the residential appraisal industry significantly. While residential appraisers used to build and maintain relationships with individual lenders in certain geographical markets, they are now pooled with a large number of other appraisers and then assigned by the AMC to an appraisal assignment from a lender. In some cases, appraisers have to bid for assignments in which the appraiser offering the lowest fee receives the assignment. As AMCs pool residential appraisers and assign them, appraisers with familiarity in a certain metropolitan submarket may be given assignments in markets they are less familiar with. Residential appraisers in Portland even reported that appraisers from Seattle, WA or Salem, OR come to Portland to value residential properties, even though they may not have any local market experience or access to the respective MLS and thus suitable comps. Geographically unfamiliar appraisers are particularly problematic as the Portland MSA is characterized by a multitude of very different neighborhoods and submarkets. With regard to previous studies of anchoring and geographical unfamiliarity (see section 2.1.2),

this represents a starting point into future research on whether out-of-town appraisers are more prone to heuristic biases and market feedback-induced biases. Alternatively, heuristic biases could be investigated by comparing the behavior of out-of-town appraisers to their behavior in their home market. Finally, the increased pressure of AMCs on residential appraisers to conduct a valuation in a relatively short amount of time (e.g. 24 or 48 hours) may increase the tendency of appraisers to rely on heuristics. Additional research into heuristic biases in real estate appraisals could investigate this issue.

Databases such as COSTAR or MLS represent rich sources of information to appraisers, which make the data collection faster and more economical. Future anchoring or feedback studies could, following Tidwell (2011), investigate whether these databases debias or bias appraisers more strongly, especially with regard to out-of-town appraisers who are provided with access to databases with information about a market they are unfamiliar with. Other studies could investigate whether this wealth of information has changed how appraisers select and weight information to be used to make an appraisal judgment.

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FIGURES

Figure 1: Histogram Valuation Case 2 (Full Sample)

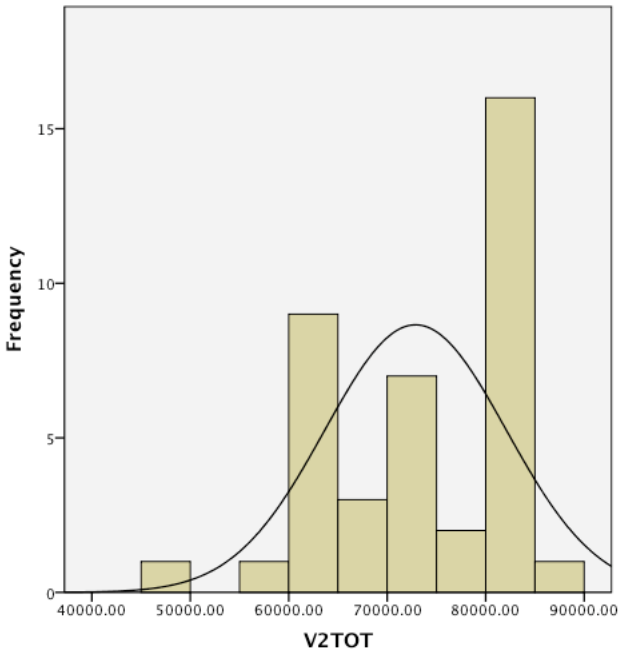
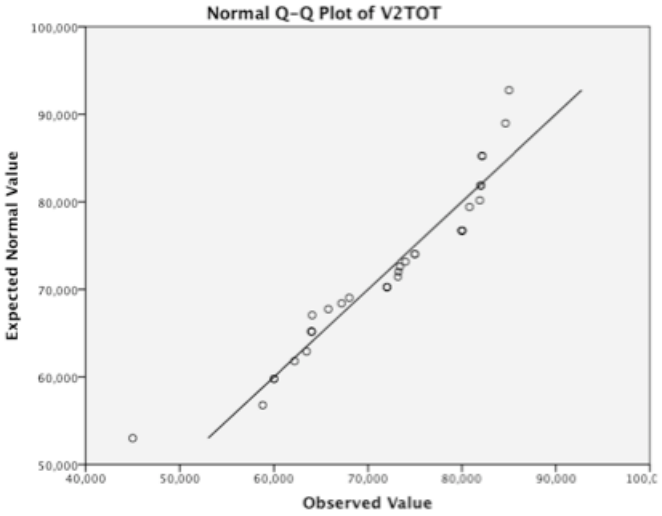


Figure 2: Q-Q Plots Valuation Case 2 (Full Sample)



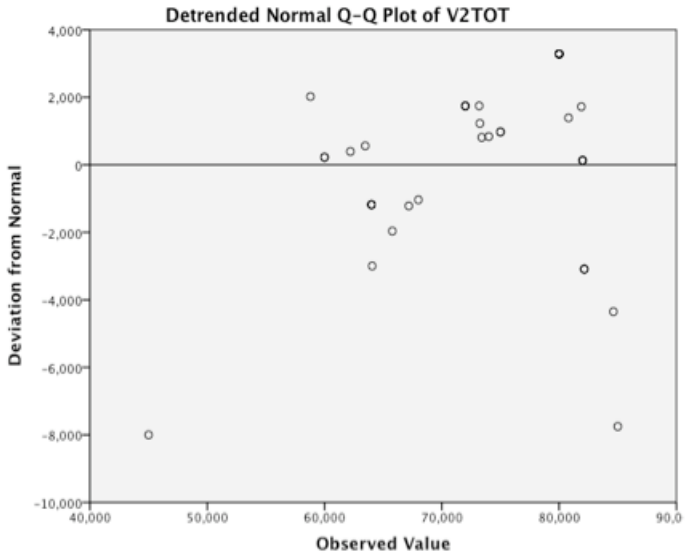


Figure 3: Histogram (DIFFVAL)

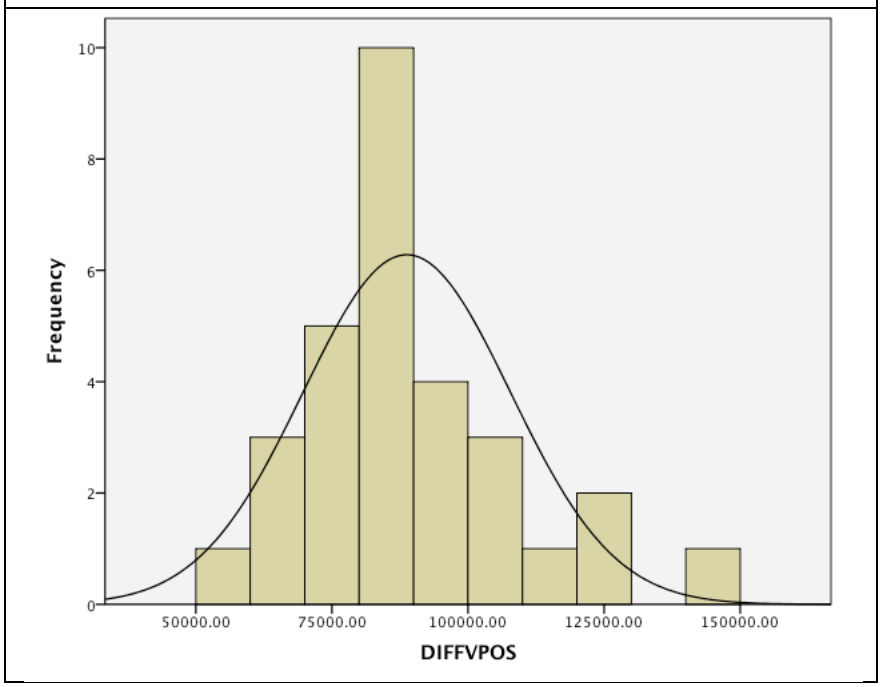
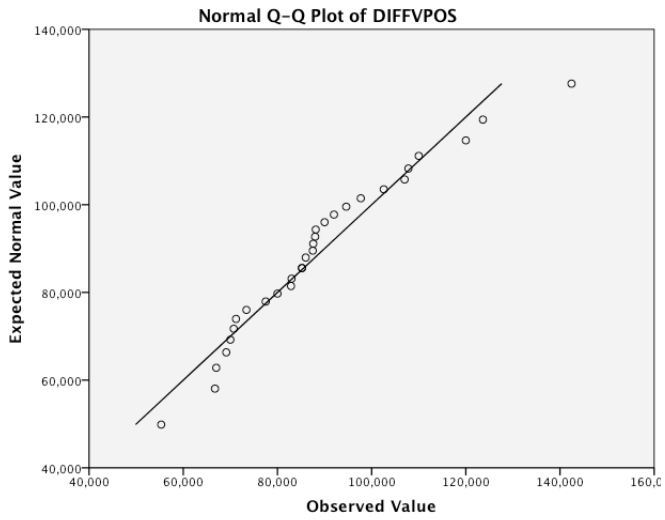
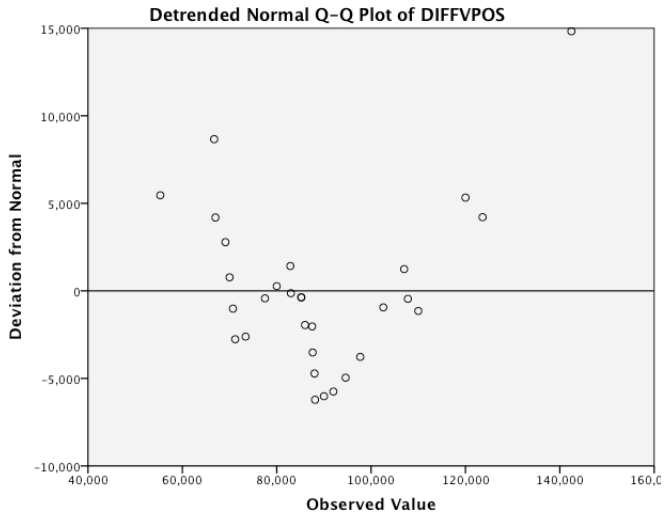


Figure 4: Q-Q Plots (DIFFVAL)





APPENDIX A: VALUATION CASE 1

PROBLEM STATEMENT

You have been engaged to estimate the market value of the fee simple interest in a 0.42 acres vacant residential tract of land in Sandy Springs, Georgia. The date of the appraisal is the most recent date of inspection, October 15, 2011.

Enclosed you will find data and information, which resulted from a diligent search of the market. Please use the attached work sheet to conduct an analysis of the market value of the subject property. After completing your analysis, enter your value estimate in the provided space provided below.

VALUE JUDGMENT

Value estimate

Per acre value estimate	***$_____***
Times 0.42 acres	***x 0.42***
Equals a total value estimate of	***$_____***
Rounded to (if necessary)	***$_____***

WORK SHEET

IDENTIFICATION OF THE SUBJECT PROPERTY

Location:	239 Devonwood Drive Sandy Springs, GA 30328
Tax Identification Number:	17 -0086-0004-022-1
County, State:	Fulton County, Georgia
Size:	0.42 acres
Zoning:	R3 (Land use code: 101 - Residential 1 family)

PURPOSE OF THE APPRAISAL

The purpose of this appraisal is to estimate the market value of the fee simple interest of the above-identified property, as of October 15, 2011, the most recent date of inspection.

MACRO LOCATION DATA

The city of Sandy Springs is a northern suburb of Atlanta and located in northwest Georgia. It is located in North-Fulton County, with Roswell to the North (8 miles), Dunwoody to the East (3.5 miles), Marietta to the West (14 miles) and Atlanta to the South (16 miles). With a 2010 population of approximately 94,000 it represents the sixth largest city in the state and the second largest city in the metro Atlanta area.

The primary north/south highways are I-75, I-85 and I-400. Sandy Springs lies outside the I-285 Perimeter. The east/west highway I-20 can be reached via the I-285. These highways connect Sandy Springs to other parts of the metro Atlanta area as well as other cities in Georgia (e.g. Augusta, Athens, Savannah) and the Southeast (e.g. Nashville, TN and Gainesville, FL). Sandy Springs is served by the Metropolitan Atlanta Rapid Transit Authority (MARTA) and connected to the metro Atlanta area by a number of bus routes and two rail stations (Sandy Springs and North Springs). Both stations offer secure parking for commuters and connections to the major employment, retail and entertainment areas in Buckhead, Midtown and Downtown. From the North Springs station, downtown can be reached within 30 minutes and the airport within 45 minutes. Slow but consistent economic growth has characterized the subject area and is expected to continue to do so. A strong employment base is present. The proximity of Sandy Springs to major highways and MARTA ensures good access to all population and employment centers in the metro Atlanta area. In 2009, the median household income for Sandy Springs was estimated to be $106,240, which is above the Georgia median income of $47,469.

NEIGHBORHOOD AND PROPERTY DATA

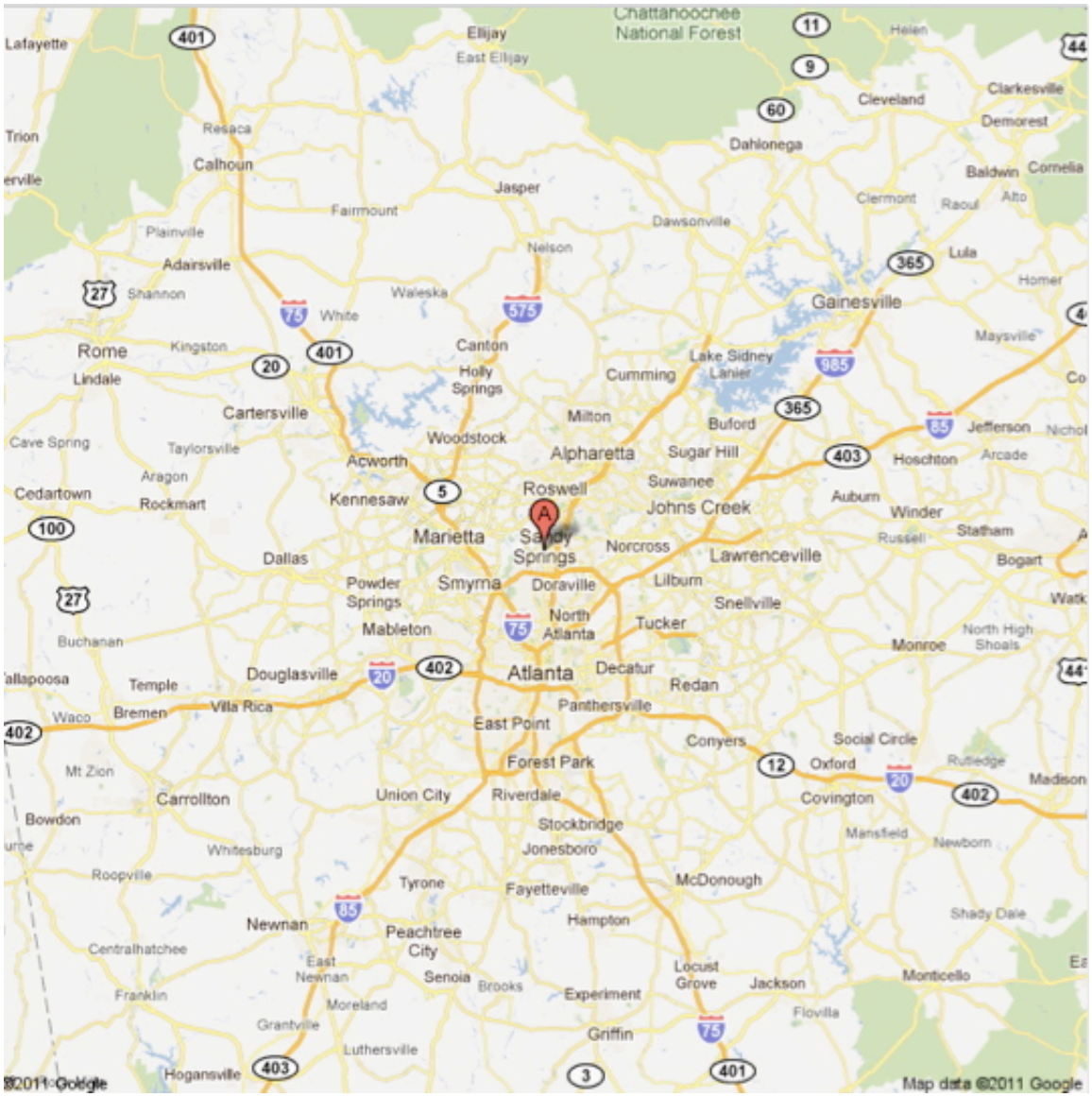
The subject property is located in a neighborhood delineated by the following major roads: Brandon Mills Road (west), Roswell Road (east), Dalrymple Road (north) and Abernathy Road (south). The neighborhood consists of single-family homes. Major retail facilities along Roswell Road and shopping centers at the intersections of Roswell Road and Abernathy Road, Johnson Ferry Road as well as Hammond Drive can be reached within 5 to 15 minutes driving time. Major retailers located within close proximity of the subject property are Publix, Whole Foods, Trader Joes and Kroger (grocery stores), Lowe's (Home Improvement) and Ross (clothing). A variety of smaller retailers, restaurants and services (e.g. medical, dry cleaning) are also located along Roswell Road. The neighborhood is very family friendly with eight schools and pre-schools within a 15 minute driving radius. These schools include the Spalding Drive Elementary School, the Jewish Weber High School, the North Springs High School, the Christian Mount Vernon Presbyterian School as well as special needs schools and daycare facilities. Georgia State University, Emory University, Georgia Institute of Technology and Kennesaw State University can be reached by public transport or car with 30 to 45 minutes. Sandy Springs is close to major hospitals, rehabilitation, senior housing and other medical facilities such as the Northside Hospital and Children's Healthcare of Atlanta.

The subject property can be accessed from Roswell Road via Abernathy Road/Brandon Mill Road or Dalrymple Road. The neighborhood is approximately 80% built-up. Good levels of maintenance and physical appearance typify the general neighborhood. No adverse neighborhood conditions are noted. The subject property is almost rectangularly shaped and has road frontage of 134.25 feet. Devonwood Drive is paved with concrete

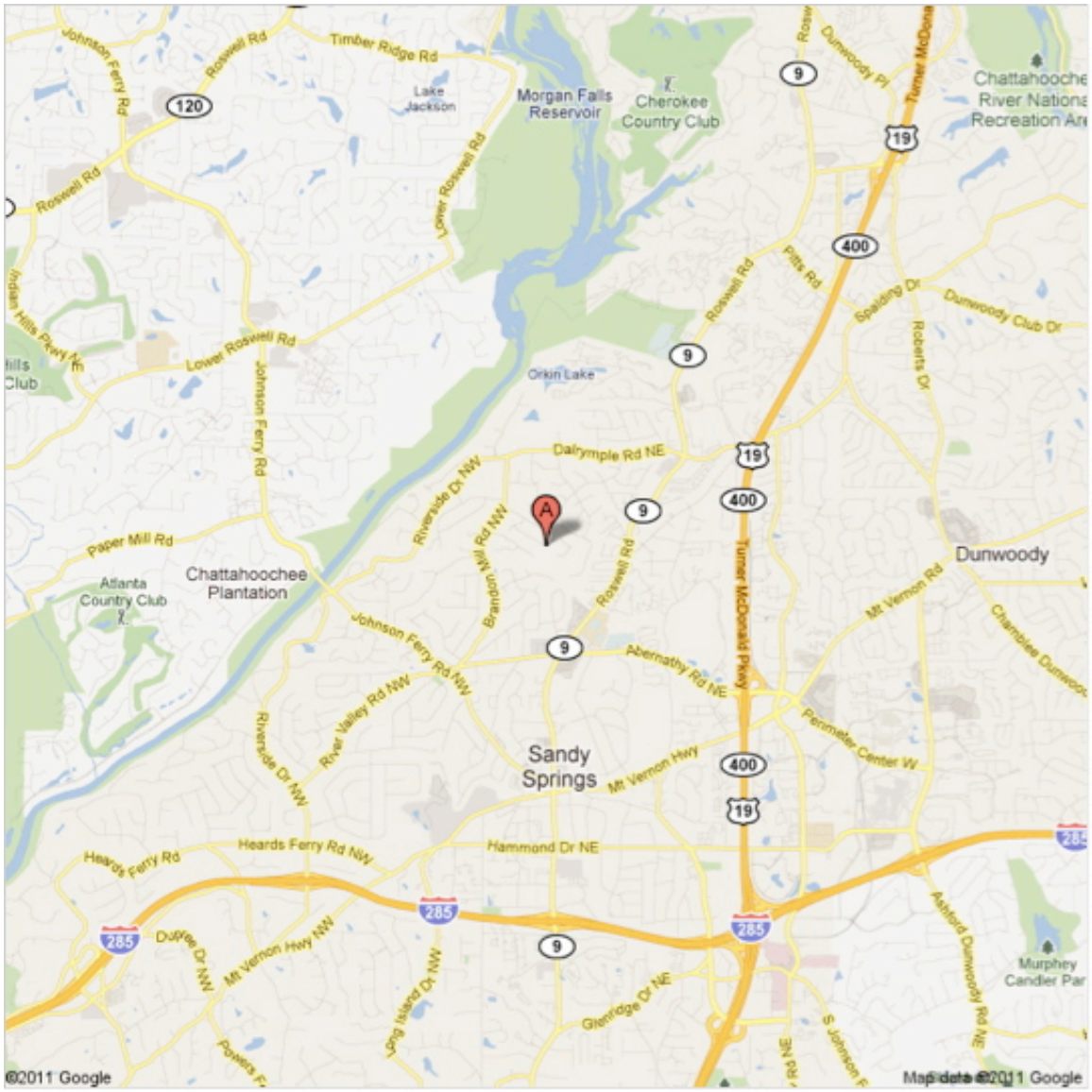
and curbing and storm sewers are present. Topographically, the property steeply slopes downward in the back. The site is served with natural gas, public water and sewer, electricity, and telephone service. Site ingress and egress are typical for the area. Presently there are no easements, encroachments or hazardous materials, which encumber the site. The subject is not located in a flood hazard zone. Police and fire protection is provided to the subject. Based on the site's size, shape, topography, accessibility and frontage, the site is considered to possess good overall physical for residential development, prevalent in the neighborhood.

The property is under the jurisdiction of Fulton County and is currently zoned R3 (101). This classification permits single-family use.

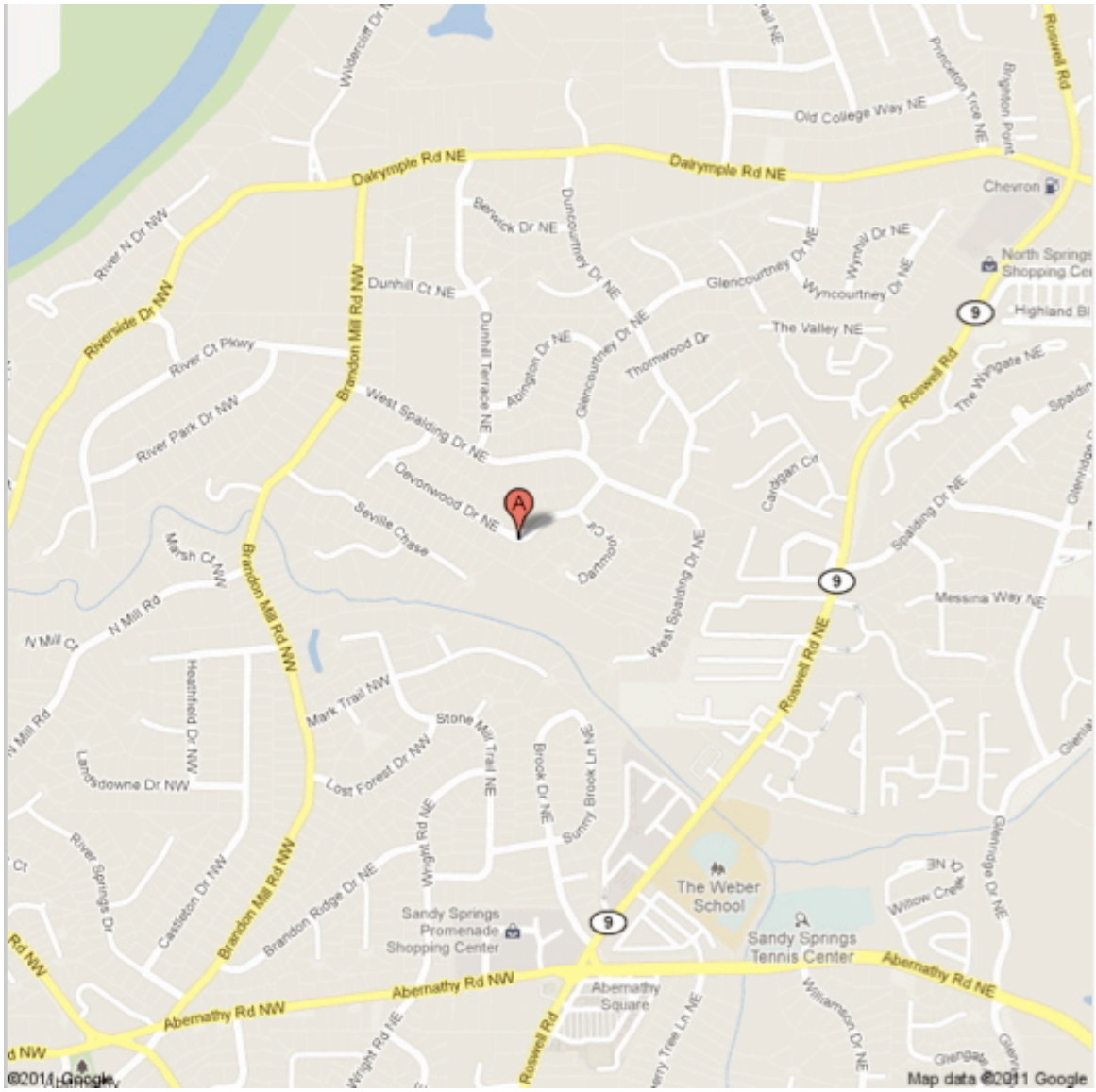
MAP 1: SANDY SPRINGS AND METRO ATLANTA



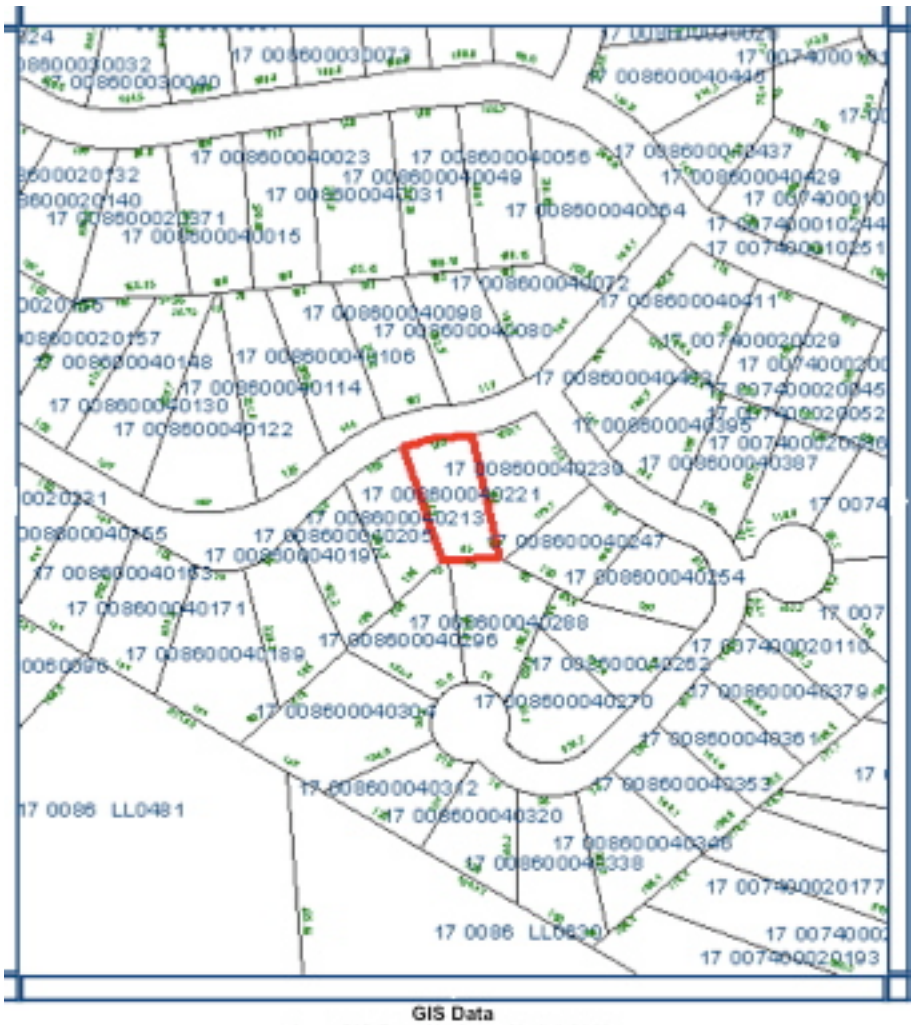
MAP 2: SANDY SPRINGS



MAP 3: SUBJECT PROPERTY NEIGHBORHOOD



MAP 4: PLAT



GIS Data
Last GIS Data Update: 19-Jul-2009

COMPARABLE SALES

LAND SALE 1

Location:	314 Spalding Drive
Sale Price:	$277,280
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	12/30/2010
Size:	0.93 acres
Price/Unit:	$298,150/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Currently vacant and cleared; site has good access, minimal site preparation required, all utilities available.

LAND SALE 2

Location:	39 Dartmoor Circle
Sale Price:	$159,705
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	02/17/2011
Size:	0.39 acres
Price/Unit:	$409,500/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Shortly after the above picture was taken, the construction on a single-family house started on the site; property has good access; typical site preparation required, all utilities available.

LAND SALE 3

Location:	256 Devonwood Drive
Sale Price:	$223,892
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	07/06/2011
Size:	0.58 acres
Price/Unit:	$386,020/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Subsequent to sale, site was improved with a single-family house; site has good access and requires minimum site preparation, all utilities available.

LAND SALE 4

Location:	247 Devonwood Drive
Sale Price:	$293,345
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	09/05/2011
Size:	0.65 acres
Price/Unit:	$451,300/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Vacant, minimal site preparation required, good access, all utilities available.

LAND SALE 5

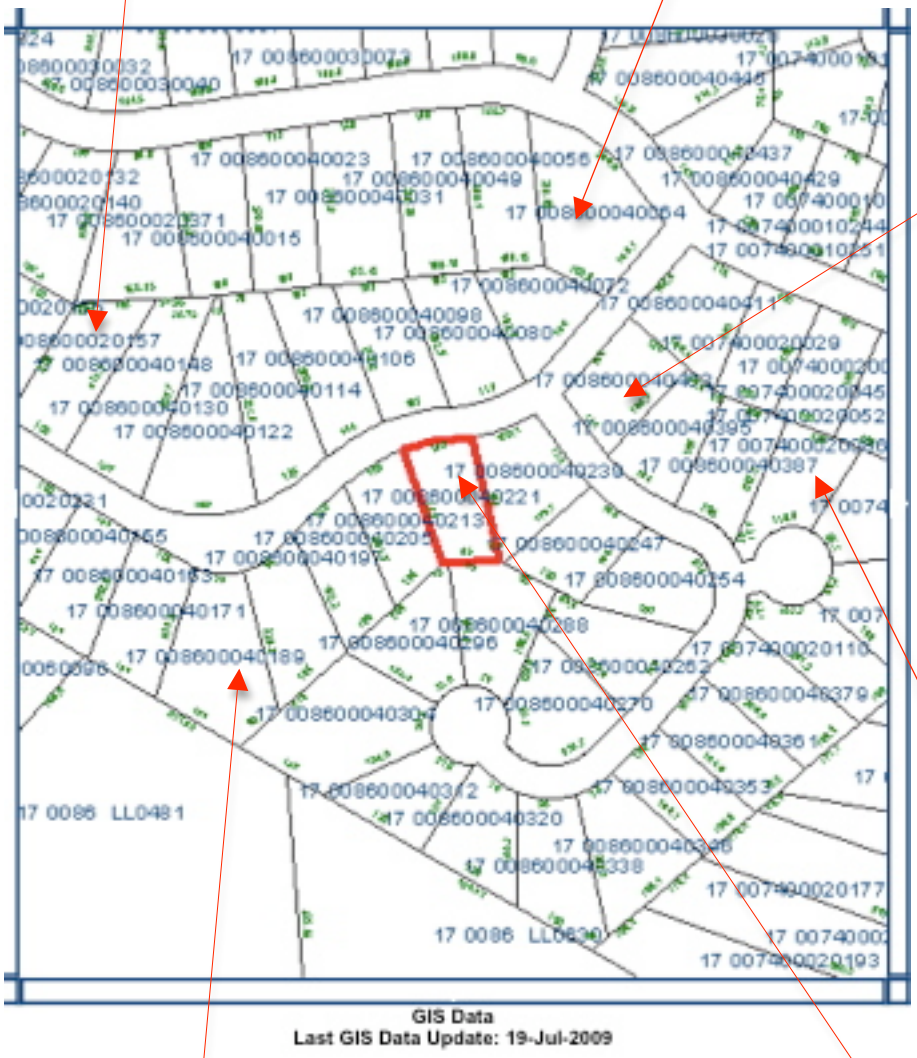
Location:	235 Devonwood Drive
Sale Price:	$149,174
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	10/01/2011
Size:	0.48 acres
Price/Unit:	$310,780/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Site is generally level and cleared and enjoys good access, all utilities available.

MAP 5: SUBJECT PROPERTY AND COMPS

Comp 3

Comp 1

Comp 5



Comp 2

Comp 4

Subject Property

APPENDIX B: VALUATION CASE 2

PROBLEM STATEMENT

You have been engaged to estimate the market value of the fee simple interest in a 0.2 acres vacant residential tract of land located in Newnan, Georgia. The date of the appraisal is the most recent date of inspection, October 15, 2011.

Enclosed you will find data and information, which resulted from a diligent search of the market. Please use the attached work sheet to conduct an analysis of the market value of the subject property. After completing your analysis, enter your value estimate in the provided space below.

VALUE ESTIMATE

Per acre value estimate ***$_____***

Times 0.2 acres ***x 0.2***

Equals a total value estimate of ***$_____***

Rounded to (if necessary) ***$_____***

Range

Lowest value $_____to Highest value $_____

WORK SHEET

IDENTIFICATION OF THE SUBJECT

Location:	45 Fourth Street Newnan, GA 30263
Tax Identification Number:	N27-0001-022
County, State:	Coweta County, Georgia
Size:	0.2 acres
Zoning:	R3 (Land use code: 101 - Residential 1 family)

PURPOSE OF THE APPRAISAL

The purpose of this appraisal is to estimate the market value of the fee simple interest of the above-identified property, as of October 15, 2011, the most recent date of inspection.

MACRO LOCATION DATA

The city of Newnan is located in and the seat of Coweta County, with Atlanta to the North (30 miles), Peachtree City to the East (13 miles) as well as Columbus (72 miles) and Auburn, Alabama (73 miles) to the South. It has a population of approximately 33,000, which grew by 103.4% over the last decade. While the county's population growth has been slowing down since 2000, the city of Newnan continues to grow substantially.

The primary north/south highway is I-85, which connects Newnan with Atlanta to the North and Columbus and Auburn, AL to the South. Coweta Transit provides public transportation services (buses) within the county. Buses operated by the Georgia Regional Transportation Authority (GRTA) offer commuters an alternative to individual transportation by connecting Newnan with downtown Atlanta. Newnan is approximately 25 miles south of the Atlanta Hartsfield-Jackson International Airport and home to the Newnan-Coweta airport, which is predominantly used for military and corporate aviation. Stable economic growth has characterized the subject area, which is expected to continue. In 2009, the median household income in Coweta County was $59,848, which is above the Georgia median income of $47,469.

The subject property is located in a neighborhood delineated by Lagrange Street to the South, Jackson Street to the East, Belk Road to the West and Clark Street to the North. It is in walking distance (15 minutes) and short driving distance (less than 5 minutes) from Newnan's historic city center, which offers a number of restaurants, shops, cafés, county administrative offices and houses of worship. Entertainment and retail facilities with

major retailers such as Kroger are located along Bullsboro Drive, which connects the historic city center with the I-85 highway. Ashley Park Shopping Center on Bullsboro Drive offers a variety of major retailers such as Best Buy (electronics), Barnes&Noble (books), Belk and Dillard's (department stores), DSW and American Eagle (clothing) as well as Regal Cinemas. These retail facilities can be reached from the subject property within 15 minutes. The neighborhood is very family friendly with nine schools and pre-schools within a driving distance of 15 minutes. These educational facilities include the Newnan High School, Atkinson Elementary School, Evans Middle School, Carolyn Barron Montessori School and a number of pre-schools. The subject property is close to the Piedmont Newnan Hospital.

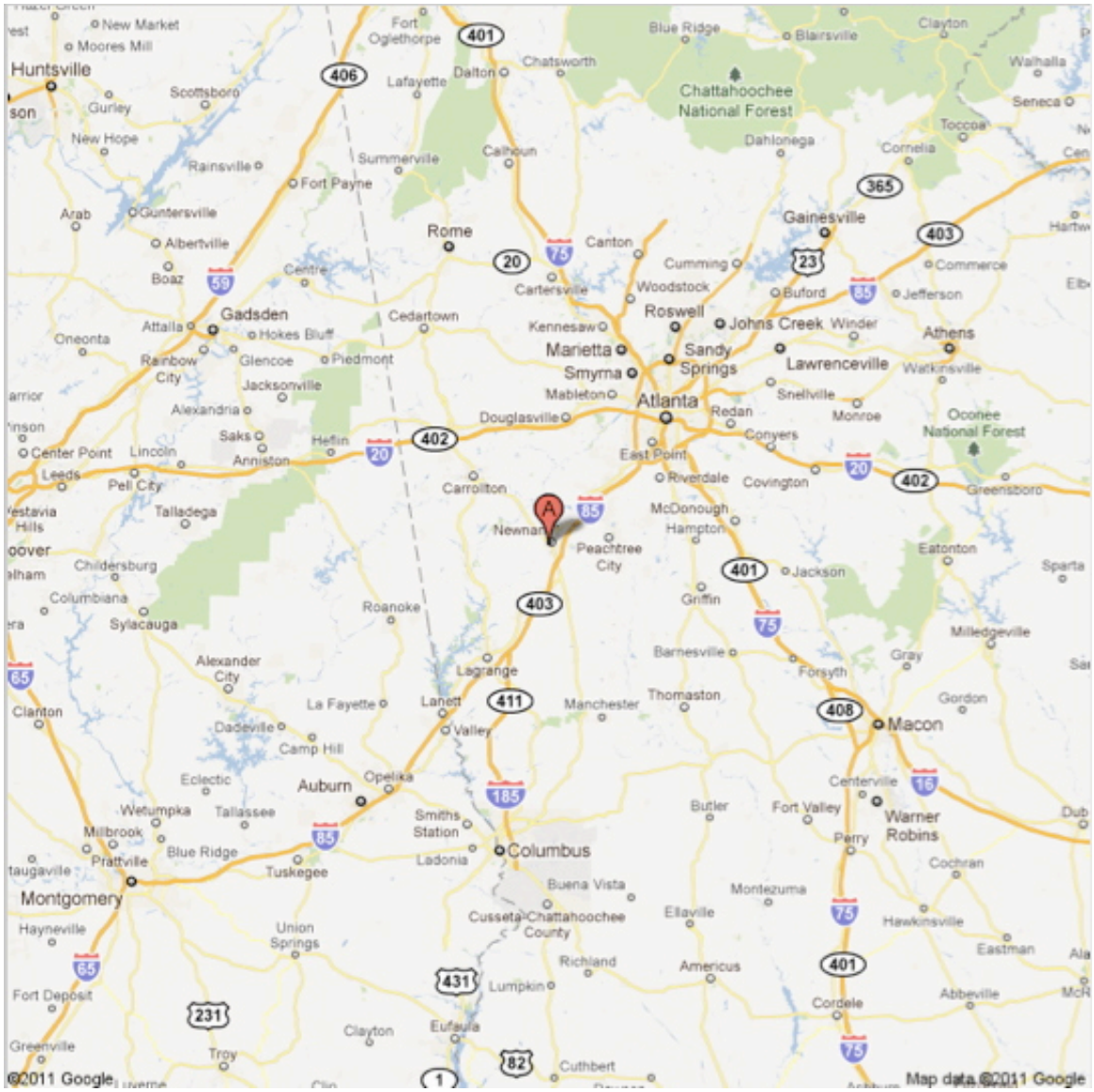
NEIGHBORHOOD AND PROPERTY DATA

The subject property can be accessed from Lagrange Street to the South and East, Spring Street to the North and Boone Drive to the West. The neighborhood is approximately 85% built up and consists of single-family houses. Good levels of maintenance and physical appearance typify the general neighborhood. Lot sizes range from 0.22 acres to 1.65 acres, with the typical lot size of 0.5 to 1 acres. Utilities include underground gas, electricity, and fiber-optic cable. The development is served with public water and sewer systems. Roads are concrete with curbs and storm sewers. No adverse neighborhood conditions are noted.

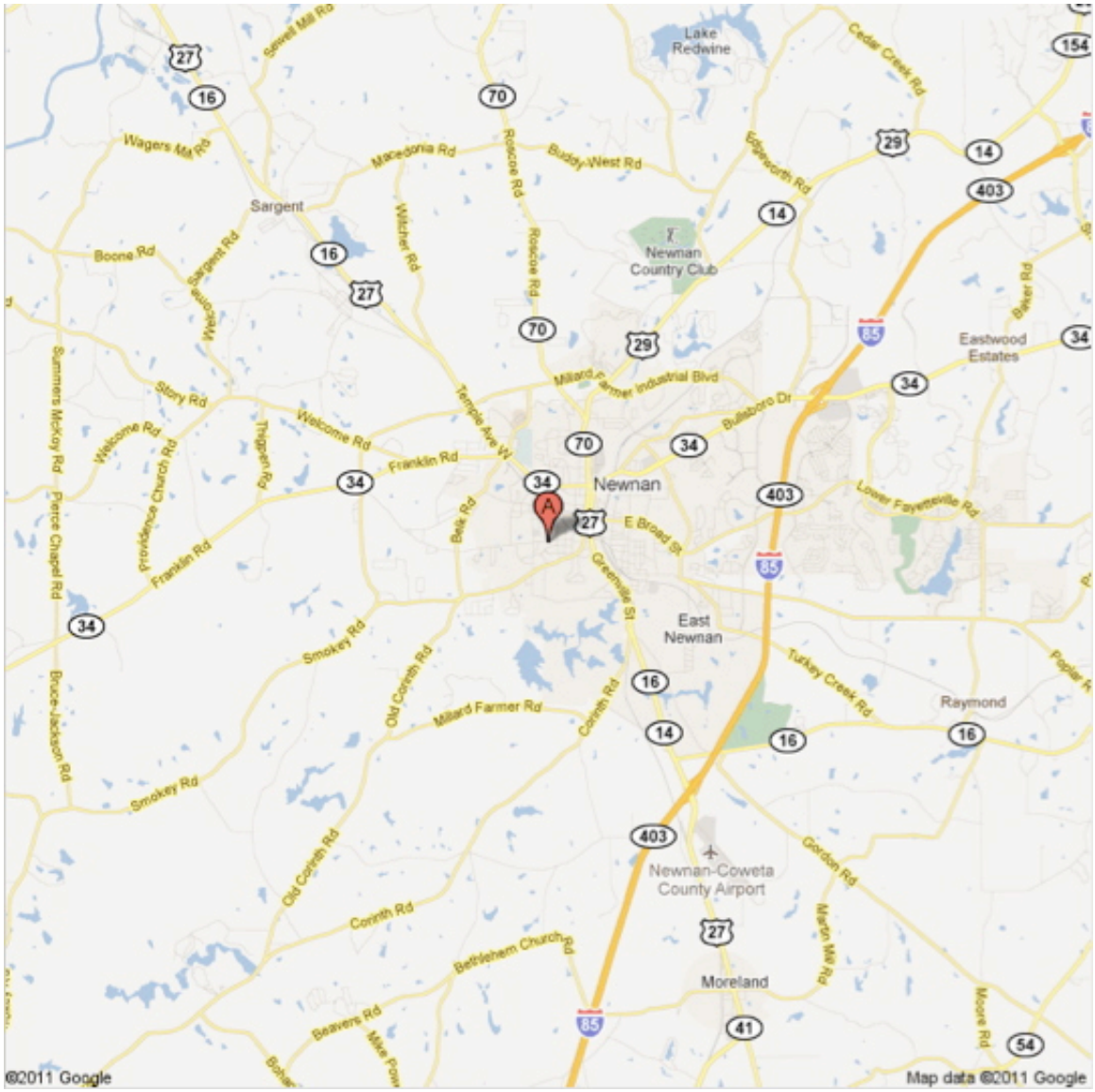
The subject property is rectangularly shaped and has road frontage of 70 feet. Curbing and storm sewers are present and topographically, the property is evenly sloped (flat). The site is served with natural gas, public water and sewer, electricity, and telephone service. Site ingress and egress are typical for the area. Presently there are no easements, encroachments or hazardous materials, which encumber the site. The subject is not located in a flood hazard zone. Police and fire protection is provided to the subject. Based on the site's size, shape, topography, accessibility and frontage, the site is considered to possess good overall physical conditions for residential development, prevalent in the neighborhood.

The property is under the jurisdiction of Coweta County and is currently zoned R3 (101). This classification permits single-family use.

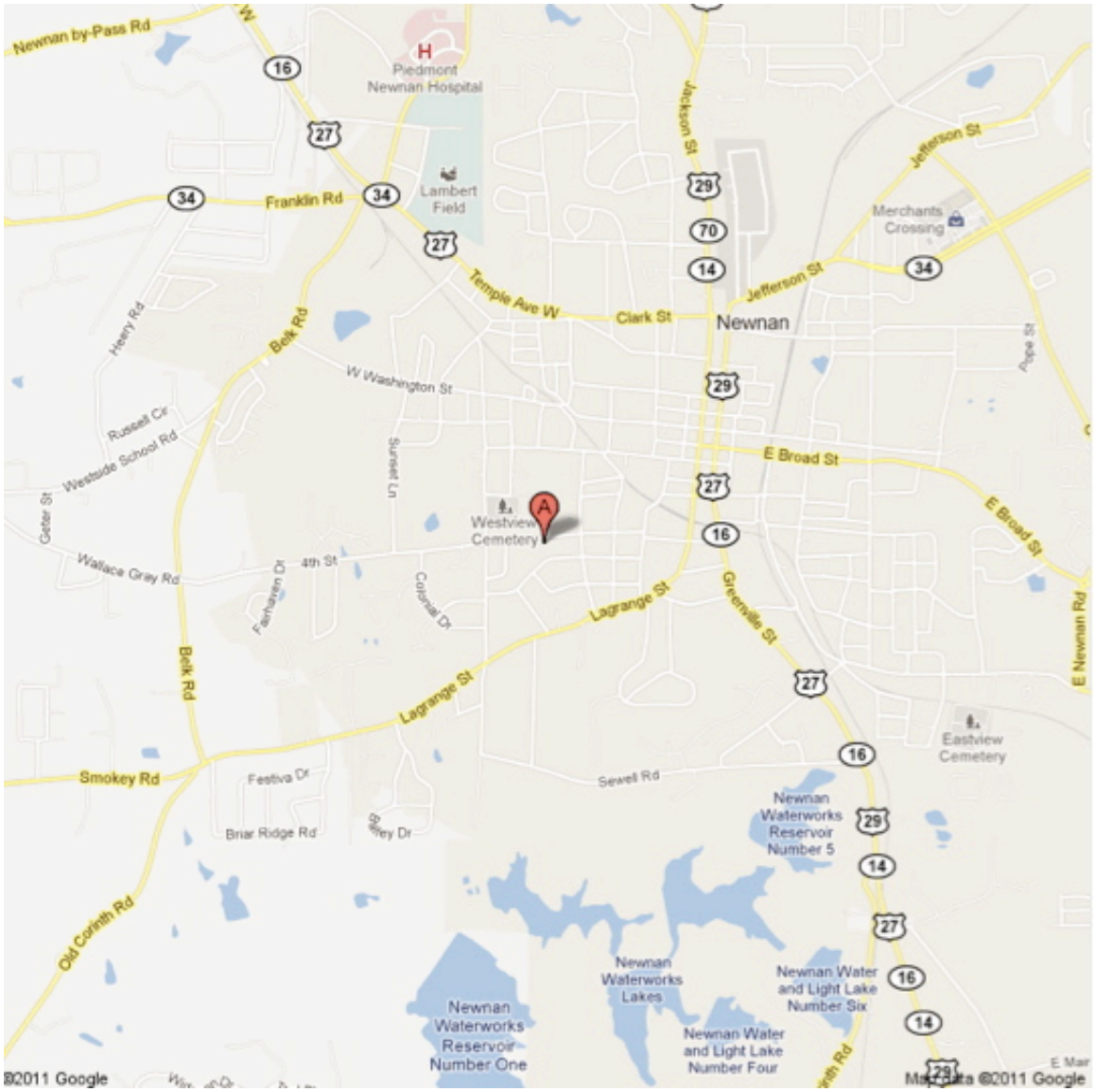
MAP 1: NEWNAN AND METRO ATLANTA



MAP 2: NEWNAN


Lake Redwine
Cedar Creek Rd
Sewell Mill Rd
Wagers Mill Rd
Macedonia Rd
Roscoe Rd
Buddy West Rd
Sargent
Boone Rd
Sargent Rd
Welcome Rd
Witcher Rd
Newnan Country Club
Eastwood Estates
Beaver Rd
Millard Farmer Industrial Blvd
Bullsboro Dr
Story Rd
Temple Ave W
Franklin Rd
Providence Church Rd
Thigpen Rd
Summers McKoy Rd
Pierce Chapel Rd
Bear Rd
Newnan
E Broad St
Greenville St
Lower Fayetteville Rd
East Newnan
Smokey Rd
Old Corinth Rd
Millard Farmer Rd
Corinth Rd
Turkey Creek Rd
Raymond
Bruce-Jackson Rd
Newnan-Coweta County Airport
Gordon Rd
Martin Mill Rd
Bethlehem Church Rd
Moreland
Beavers Rd
Moore Rd
©2011 Google
Map data ©2011 Google

MAP 3: SUBJECT PROPERTY NEIGHBORHOOD



MAP 4: PLAT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COMPARABLE SALES

LAND SALE 1

Location:	36 Waverly Circle
Sale Price:	$186,606
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	02/01/2011
Size:	0.63 acres
Price/Unit:	$296,200/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Currently vacant and for sale; site is level and enjoys good access, all utilities available.

LAND SALE 2

Location:	58 Fourth Street
Sale Price:	$82,140
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	08/18/2011
Size:	0.2 acres
Price/Unit:	$410,700/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Subsequent to sale, site was improved with a single family home; site has good access and required minimum site preparation, all utilities available

LAND SALE 3

Location:	37 Fourth Street
Sale Price:	$58,690
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	09/10/2011
Size:	0.26 acres
Price/Unit:	$225,731/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Single family home is currently under construction on the site; property has good access; typical site preparation required, all utilities available.

LAND SALE 4

Location:	26 Fourth Street
Sale Price:	$135,957
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	03/07/2011
Size:	0.37 acres
Price/Unit:	$367,450/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Vacant and cleared, minimal site preparation required, good access, all utilities available.

LAND SALE 5

Location:	42 Fourth Street
Sale Price:	$57,657
Financing:	Cash to seller, typical terms considered cash equivalent
Date of Sale:	07/30/2011
Size:	0.18 acres
Price/Unit:	$320,316/acre
Zoning:	R3 (Land use code: 101 - Residential 1 family)
Remarks:	Currently vacant and leveled; site has good access, minimal site preparation required, all utilities available.

MAP 5: SUBJECT PROPERTY AND COMPS

Subject Property

Comp 5

APPENDIX C: EXIT QUESTIONNAIRE

1. **What is your gender?** Female Male
2. **What is your age?** Years
3. **Are you currently working as residential appraiser?** Yes No
4. **How many years of experience in residential appraisal do you have?** Years
5. **What is your highest level of formal education?**

   High School Some College Bachelor's Degree Graduate Degree

6. **What percentage of your work is in residential real estate valuation?**

   Residential: % Other: %

7. **List any appraisal certifications and/or designations you presently hold:**

8. **How confident do you feel about your estimates in the two valuations? Please circle a number.**

Case 1 (Sandy Springs):

Not at all confident				**Very confident**
1	2	3	4	5

Case 2 (Newnan):

Not at all confident				**Very confident**
1	2	3	4	5

9. What percentage of your appraisal work comes from the following sources?

Mortgage lenders:	%
Individual homebuyers/sellers:	%
Appraisal management company:	%
Governmental agencies:	%
Other:	%

If other, please provide more information about the source:

10. Overall, in what phase of the market cycle do you think the housing market in the metro Portland area is currently in? Please circle your answer.

(1) *"upward-trending"* (2) *"boom"* (3) *"downward-trending"* (4) *"bottom"*

(5) *"not sure"*

11. Have you had any recent appraisal assignments in the metro Atlanta area?

No Yes (explain)