TWO ESSAYS IN BANKING AND FINANCE

by

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ABSTRACT OF DISSERTATION

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This dissertation includes two essays. The first essay investigates whether money illusion misleads investors in the stock market. To the extent that anomalies reflect mispricing, I examine whether money illusion plays a role in the anomaly-based strategies. I find that, following high inflation, anomalies are stronger and the returns on the short-leg portfolios are lower. These findings indicate investors are overly optimistic on the past performance of stocks and overestimate the upside potential of stock returns following high inflation periods. I extend the effect of money illusion by examining sentiment and other commonly used measure for predicting stock returns. I find that money illusion-driven mispricing remains largely unchanged after controlling for many additional variables. These results suggest that money illusion provides a complementary power for cross-sectional stock returns beyond commonly used variables. In summary, this essay contributes to the literatures on money illusion and mispricing by providing evidence that money illusion can lead to mispricing in the stock market.

The second essay indentifies a new risk factor for bank stock returns. First, I document that standard factor models do not explain bank stock returns well. I investigate the linkage between Loan Loss Provision (LLP) and bank stock

returns. I find that low-LLP bank stocks have significantly higher risk-adjusted returns than medium- and high-LLP bank stocks. These findings indicates that low-LLP banks are more likely distressed when economic conditions are bad, as a result, investors require higher returns on low-LLP bank stocks. Most importantly, the new factor model including the LLP return factor adds a new dimension of explanatory power for bank stock returns, reducing the magnitude of alphas mostly to insignificance. Combined with its economic intuition, this essay suggests that loan loss provisions play an important role in evaluating bank stock returns.

DEDICATION

To my family

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1.1 Introduction

Whether inflation, namely money illusion, affects stock prices is a question of long-standing interest to researchers. Fisher (1928) defines money illusion as "the failure to perceive that the dollar, or any other unit of money, expands or shrinks in value." In the early literature, equities had often been regarded as a claim against physical assets whose real returns remain unaffected by inflation.[1] However, contrary to the conventional view, many empirical studies find a negative relation between inflation and stock returns.[2]

In recent years, many papers have shown the renewed interest in the existence of money illusion in the capital market. For example, Cohen, Polk, and Vuolteenaho (2005) revisit the issue of money illusion and provide a strong support for Modigliani and Cohn (1979) hypothesis.[3] Brunnermeier and Julliard (2008) find that housing market trends are largely explained by variations in

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[1] Many researchers thought that Fisher (1930) hypothesis that a nominal interest rate fully reflects the available information concerning the future values of the rate of inflation might also hold for the stock return-inflation relation. Regarding this, Tobin (1972) described: "An economic theorist can, of course, commit no greater crime than to assume money illusion". See Fehr and Tyran (2001) for detailed discussion.

[2] For example, see Bodie (1976), Jaffe and Mandelker (1976), Nelson and Schwert (1977), Fama and Schwert (1977), Gultekin (1983), Modigliani and Cohn (1979) Kaul (1987, 1990), and Kaul and Seyhun (1990).

[3] Modigliani and Cohn (1979) propose the hypothesis that stock market investors are subject to inflation illusion. Modigliani and Cohn (1979) assume that the valuations of the assets differ from their fundamental values because of inflation-induced errors in their subjective judgments.

inflation.[4] These recent studies suggest that money illusion possibly leads to mispricing in the stock market. In this paper, motivated by controversial findings in earlier works and recent renewed interests in money illusion, I investigate the role of money illusion in the stock market by testing anomaly-based strategies.

The objective of this paper is to examine whether money illusion plays an important role in affecting the degree of mispricing in the stock market. At the simplest level, money illusion occurs when investors mix real growth rates with nominal discount rates. This valuation error can induce significant impact on the stock prices. The key explanation of money illusion effects is that, following high inflation periods, money-illusioned investors are overly optimistic for the past performance of equities and excessively extrapolate into the future when they value firms. To the extent that a firm's stock price reflects the views of investors who are more optimistic, the presence of money-illusioned investors can cause a stock price to depart from its fundamental value.

I start by testing the relation between money illusion and stock market returns. Consistent with the findings in the previous literature, I find that the money illusion is a negative predictor for stock market returns during the period of 1965-2010. The magnitude of predictability is statistically significant and economically large. In the univariate regression, I find that a one standard deviation increase in money illusion is associated with about a 0.5% decline in one month-ahead market returns. In the multivariate regressions, I control for

[4] In addition, Sharpe (2002), Ritter and Warr (2002), Campbell and Vuolteenaho (2004), Chen, Lung, and Wang (2009), Lee (2010), Birru and Wang (2014), and Warr (2014) have studies the effect of money illusion in the capital market.

three predictive variables related to interest rates and find that the effect of money illusion remains significantly negative.[5] These findings suggest that investors may overestimate the upside potential of stock returns following high inflation periods, and subsequently experience negative returns.

To examine whether money illusion leads to mispricing, I entertain the possibility that anomalies at least partially reflect mispricing in the stock market. In previous studies, Stambaugh, Yu, and Yu (2012) explore the role of investor sentiment in a broad set of anomalies in cross-sectional stock returns.[6] Similar to Stambaugh, Yu, and Yu (2012), I investigate the role of money illusion in the stock market by examining the anomaly-based strategies associated with mispricing. I consider 11 well-documented anomalies in the previous literature. These anomalies include size, value (book-to-market equity), financial distress, net stock issues, earnings quality, gross profitability, returns-on-assets (ROA), investment-to-assets, external financing, and asset turnover. It is worthwhile to emphasize that, while this study shares a similar setting with Stambaugh, Yu, and Yu (2012), I focus on inflation to investigate whether money illusion affects the degree of mispricing in the stock market.[7] To the best of my knowledge, this is the first paper to examine the relation between money illusion and anomaly returns.

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[5] The three predictive variables are: *T-bill* is the 3-month T-bill rate. *Term* is the difference between yield on 10-year bond and the T-bill. *Default* is the difference between Baa and Aaa-rated corporate bonds.

[6] Stambaugh, Yu, and Yu (2012) combine the presence of market-wide sentiment with the Miller (1977) short-sale argument.

[7] Many fundamental mechanisms, including the divergence of opinions and short-sale constraints (Miller (1977), Hong and Sraer (2012)) and sentiment (Baker and Wurger (2006), Stambaugh, Yu, Yuan (2012)), can potentially lead to mispricing in the stock market. In this study, I simply use money illusion as a proxy for mispricing.

Two main empirical implications are tested to explore the role of money illusion in the stock market. The first hypothesis is that anomalies are stronger following high inflation periods. The first hypothesis indicates that the long-short spread should be larger following high inflation. Consistent with the first hypothesis, I find that each of the long-short anomaly-based strategies presents higher average returns following high inflation. In the predictive regressions, I find a positive relation between money illusion and the long-short spread. These results imply that mispricing is stronger following high inflation periods. I find a one standard deviation increase in money illusion is associated with $0.0061 of an additional monthly profit in each long-short spread. Clearly, these findings suggest that money illusion plays an important role in affecting the degree of mispricing in the stock market.

The second hypothesis is that stock returns on the short-leg portfolio should be lower following high inflation. If this is due to mispricing, the stocks in the short-leg portfolio should be relatively overpriced compared to the stocks in the long-leg. This indicates that the stocks in the short-leg portfolio should be more overpriced following high inflation, and as a result, have lower returns. Consistent with the second hypothesis, I find that the short-leg portfolio of all anomaly-based strategies has lower excess returns following high inflation periods. The short-leg portfolio of the combined strategy earns 177 bps less per month following high inflation periods than low inflation periods. In the predictive regressions, I find that the slope coefficients for the short-leg returns of all anomalies are negative. These results suggest that investors overly extrapolate past performance into the future, subsequently experience negative returns. The combination strategy implies that a one standard deviation increase in money illusion is related to 0.6% decrease in monthly excess return on the short-leg portfolio. These findings provide clear evidence that money-illusioned investors overestimate the upside potential of stock returns following high inflation periods.

To better understand the results of this study, I empirically investigate the possible source of money illusion-driven mispricing. I examine two prominent explanations: the risk-based explanation and the behavioral-based explanation. The risk-based explanation argues that the omitted risk factor's premium may explain the required correlation with money illusion. The behavioral-based explanation argues that investors excessively extrapolate on past performance when they value firms and are surprised by the subsequent return reversal. I examine the potential for a risk-based explanation by controlling for an additional set of variables. I find that the effect of money illusion remains largely unchanged: the predictive power of money illusion for anomaly returns does not weaken after controlling for macro-variables and firm level predictive variables.[8] In addition, to access the potential for a behavioral-based explanation for previous results, I examine the relation between money illusion and analyst forecast errors and dispersion. I find that money illusion negatively predicts forecast errors and

[8] The variables are: T-bill as the 3-month T-bill rate, Term as the difference between yield on 10-year bond and the T-bill, Default as the difference between Baa and Aaa-rated corporate bonds, the earnings-to-price ratio, the dividend-to-price ratio, and the equity variance.

dispersion. [9] The results indicate that investors' ex-ante expectation of future performance was too optimistic and subsequently surprised by the return reversal. These results indicate evidence in support of that the behavioral-based explanation.

Finally, I extend the exploration of money illusion effects by examining sentiment and other commonly use measure for predicting stock returns. Many previous studies indicate that sentiment captures market-wide impacts in the stock market.[10] I control for the effect of sentiment to investigate whether money illusion plays an additional role in cross-sectional stock returns. I find that the effect of money illusion remains largely unchanged after controlling for sentiment and many additional variables.[11] The results suggest that money illusion can provide the complementary power for cross-sectional stock returns beyond the commonly used variables. Overall, this study contributes to the literature on money illusion and mispricing by providing new evidence that money illusion can lead to mispricing in the stock market.

This paper is organized as follows. Section 1.2 discusses related literatures and develops hypotheses. Section 1.3 introduces data and presents descriptive statistics. Section 1.4 reports main results. Section 1.5 investigates

[9] The results are consistent with the prediction of Stambaugh, Yu, and Yu (2012) that investors' views must be sufficiently disperse to include rational valuation when sentiment is low.

[10] For example, Baker and Wugler (2006) provide strong evidence that investor sentiment have significant effects on the stock returns. Stambaugh, Yu, and Yu (2012) find evidence that anomaly returns are larger following high levels of sentiment.

[11] I control for an additional set of macro-related variables that seem reasonable to entertain as being correlated with the risk premium. I control for yield premium, term premium, and default premium, earnings-to-price ratio, the dividend-to-price ratio, and the equity variance.

the source of money illusion-drive mispricing. Section 1.6 examine whether money illusion provides the complementary power to explain the cross-sectional stock returns. Section 1.7 suggests a simple model for money illusion-driven mispricing and section 1.8 concludes.

1.2 Related Literature and Hypothesis Development

1.2.1 Related Literature

Whether the inflation, namely money illusion, affects stock prices is a question of long-standing interest to researchers. The concept of money illusion was analyzed in detail for the first time by Fisher (1928). As Fisher (1928) defines money illusion as “the failure to perceive that the dollar, or any other unit of money, expands or shrinks in value”, numerous papers have examined the existence of money illusion in equity markets. Among many papers, it is worth referring to the survey conducted by Shafir, Diamond, and Tverky (1997). Shafir, Diamond, and Tverky (1997) find that money illusion is a persistent phenomenon among economic and non-economic agents. In a same vein, Fehr and Tyran (2001) present that a presence of money-illusioned agents can cause significant impacts in capital markets.

The relation between stock returns and inflation has been studied for many years. Equities had traditionally been regarded as a hedge against inflation because equities are claims against physical assets whose real returns should remain unaffected by inflation. Numerous researchers thought that the Fisher

(1930) hypothesis, which posit that a nominal interest rate fully reflects the available information concerning the future values of the rate of inflation, might also hold for the stock return-inflation relation. However, contrary to the conventional view and the Fisher hypothesis, many empirical studies find a negative relation between inflation and real stock returns.

There is an extensive literature documenting that realized returns are negatively influenced by inflation. (See, for example, Bodie (1976), Jaffe and Mandelker (1976), Nelson and Schwert (1977), Fama and Schwert (1977), and Gulteken (1983)) Several hypotheses have been proposed to explain the observed negative relation between stock returns and inflation.[12] Modigliani and Cohn (1979) propose the inflation illusion hypothesis that stock market investors are subject to inflation illusion. Modigliani and Cohn (1979) assume that the valuations of the assets differ from their fundamental values because of two inflation-induced errors in judgment. To explain the inverse relation, Fama (1981, 1983) proposes the proxy hypothesis. The proxy hypothesis suggests that a rise in expected inflation rationally induces investors to reduce expected future real dividend growth prices and expected real discount rates, subsequently lowers stock prices and realized returns. Later on, Amihud (1996) tests the relationship between unexpected inflation and stock returns in Israel and conclude that his results support only the proxy hypothesis explanation.

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[12] Additionally, Geske and Roll (1983) and Kaul (1987) argue that the relationships are driven by links between expected inflation and expected real economic performance. Feldstein (1980) proposes the tax hypothesis to explain the inverse relation between higher inflation and lower share prices. Brandt and Wang (2003) propose the time varying risk aversion hypothesis.

In recent years, several papers have documented the renewed interests in the existence of money illusion, suggesting the possibility of money illusion-induced mispricing in capital markets. For example, Ritter and Warr (2002) find that the bull market starting in 1982 was due in part to equities being undervalued, whose cause is cognitive valuation errors of levered stocks in the presence of inflation and mistakes in the use of nominal and real capitalization rates. Campbell and Vuolteenaho (2004) revisit the issue of the stock price-inflation relation based on the time-series decomposition of the log-linear dividend yield model and provide strong support for Modigliani and Cohn (1979) hypothesis.[13] Cohen, Polk, and Vuolteenaho (2005) present cross-sectional evidence supporting Modigliani and Cohn's hypothesis by simultaneously examining the future returns of Treasury bills, safe stocks, and risky stocks. Cohen, Polk, and Vuolteenaho (2005) find that money illusion causes the market's subjective expectation of the equity premium to deviate systematically from the rational expectation.

Other recent studies about money illusion have examined earnings forecasts, bubbles, dividend announcements and house prices. Sharpe (2002) find that analysts suffer from money illusion in their forecasts. Chordia ans Shivakumar (2005) find that money illusion causes firms whose earnings are positively related to inflation to be undervalued because investors fail to incorporate the effect of inflation on the earnings growth rate. Focusing on asset bubbles, Chen, Lung, and Wang (2009) find that while inflation illusion can

[13] Campbell and Vuolteenaho (2004) use the Campbell and Shiller (1988) valuation model to decompose the dividend yield to examine the effect of inflation.

explain the level of mispricing, it does not explain the volatility of mispricing. Brunnermeier and Julliard (2008) test the effect of the Modigliani and Cohn hypothesis on house prices and show that housing market trends are largely explained by variations in the inflation, suggesting that home buyers suffer from inflation illusion.

Given the discussion of numerous literatures, the impact on the economy and stock returns arising from the effects of inflation are indisputable. Motivated by controversial findings in earlier works and recent renewed interests in money illusion, I explore the role of money illusion in the mispricing of stock returns and anomalies.

1.2.2 Hypotheses Development

To test whether money illusion plays an important role in affecting the degree of mispricing in the stock market, I entertain the possibility that anomalies at least partially reflects mispricing related to money illusion. In previous studies, combining the impediments to short selling as in Miller (1977), Stambaugh, Yu, and Yu (2012) explore the role of investor sentiment in a broad set of anomalies in cross-sectional stock returns. Similar to Stambaugh, Yu, and Yu (2012), I examine the relation between money illusion and its role in a broad set of anomaly- based strategies.

Two main empirical implications are tested to investigate the effect of money illusion on mispricing. The first implication is that mispricing should be stronger following high inflation. At the simplest level, money illusion occurs when investors mix real growth rates with nominal discount rates. This implies that a presence of money-illusioned investors can cause a stock price depart from its fundamental value. The key explanation of money illusion effects is that, following high inflation periods, money-illusioned investors are overly optimistic for the past performance of equities and excessively extrapolate into the future when they value firms. This valuation error can induce significant impacts in market prices in that a firm's stock price can reflect the view of investors who are overly optimistic. In contrary, during low inflation periods, the most optimistic views about stocks tend to be those of rational investors, and thus mispricing during those periods is less likely. Therefore, the first hypothesis is that anomalies are stronger following high inflation periods. This indicates that the long-short spread should be larger following high inflation. The positive profit on each long-short strategy reflects the unexplained cross-sectional difference in stock returns that constitutes an anomaly.

The second implication is that the stocks in short leg should be more overpriced following high inflation. Stocks in short leg are relatively overpriced compared to the stocks in the long leg. Specially, overpricing becomes more difficult to eliminate with impediments to short selling. If the primary form of mispricing is overpricing, such overpricing can occur for many stocks during high inflation periods. This implies that the stocks in short leg should be more overpriced following high inflation. In this regard, the second hypothesis is that stock returns on the short-leg portfolios should be lower following high inflation.

This indicates that investors may overestimate the upside potential of stock returns following high inflation periods and subsequently experience negative returns.

It is worthwhile to emphasize that, while this study shares a similar setting with Stambaugh, Yu, Yuan (2012), I focus on inflation to examine whether money illusion plays an important role in affecting the degree of mispricing. Many fundamental mechanisms, including the divergence of opinions and short-sale constraints (Miller (1977), Hong and Sraer (2011)) and sentiment (Baker and Wurger (2006), Stambaugh, Yu, Yuan (2012)), can potentially lead to mispricing in the stock market. In the current study, I simply use money illusion as a proxy for mispricing.

1.3 Data

This section describes the data used in this study. I obtained the data from several sources. I compile market returns and S&P 500 returns from CRSP. Four measures of stock market returns are used: the value-weighted raw returns, the value-weighted excess returns, the S&P 500 raw returns, and the S&P excess return. The accounting information is obtained from COMPUSTAT. The sample period is 1965 to 2010. I also conduct sub-sample analysis over period 1970-1990 to ensure the robustness of results.

Inflation, namely money illusion, is defined as the change in Consumer Price Index (CPI) from year *t-1* to *t*,

$$Money\ Illusion_t = (CPI_t - CPI_{t-1})/CPI_{t-1}$$

The data for CPI is obtained from the Bureau of Labor Statistics. Figure 1 plots *money illusion* and CPI (Consumer Price Index) from 1965 and 2010. The inflation is relatively high and volatile during 1970-1980. After 2000, the inflation is getting more volatile: The inflation peaked in 2005 once and immediately plummeted. It reached a peak again in 2006 then it crushed in 2008.

Interest rates data including 10-year and 3-month Treasury bills are downloaded from Federal Reserve Economic Data (FRED). I use three predictive variables related to interest rates. I use the excess returns on an index of 10-year bonds issued by the U.S. treasury as a *Term*. I use the excess returns on an index of investment grade corporate bonds as a *Default*. The one-period change in the option adjusted credit spreads for Moody's Baa-rated corporate bonds is used as the investment grade corporate bond rate. To compute excess returns, I use the three-month Treasury bill (*T-bill*) rate as the risk-free rate.

1.3.1 Descriptive Statistics

Table 1 report the descriptive statistics for the market returns and inflation from 1965 to 2010. The entire sample size is 2,131,852. Panel A shows that money illusion has an average of 0.35% and a standard deviation of 0.36% monthly. Monthly average of the value-weighted raw return is 0.87% and the monthly average of value-weighted excess returns is 0.43%, with standard deviations of 4.58% and 4.59%. The monthly average raw return on S&P 500 is

0.59% and the excess returns is 0.14%, with standard deviation of 4.42% and 4.43%. Panel B presents the correlations between stock market returns and inflation. All correlations of stock market returns with inflation are negative and the magnitudes are around -10%. This negative relation is consistent with the expected cross-sectional correlation between stock market returns and money illusion.

1.4 Results

1.4.1 Univariate Regression

I run predictive regression of one-month-ahead market returns on inflation. Table 2 presents the results of univariate regressions. Panel A reports the results over the periods 1965-2010 and Panel B reports the results over the sub-period 1970-1990. I use four measures of stock market returns: the value-weighted raw returns, the value-weighted excess returns, the S&P 500 raw returns, and the S&P excess return. The independent variable, money illusion, is standardized to have zero mean and unit variance, in order to interpret the economic significance of the predictability.

I find that money illusion is a negative predictor of the stock market returns. The magnitude is economically large: a one standard deviation increase in inflation is associated 0.53% decline in one-month-ahead value-weighted excess returns. For returns on value-weighted raw returns, the coefficient estimate is -0.42%. For returns on S&P 500, the slope estimates are larger and still economically big: -0.56% for S&P 500 excess return and -0.45% for S&P 500 raw return. Turing to Panel B, money illusion more significantly negatively predicts stock market returns for the subsample period with adjusted R^2 varying from 3.4% to 4.5%. The OLS estimates on money illusion are -0.96 % for the value-weighted raw return and -1.05% for the value-weighted excess return monthly. For Returns on S&P 500 excess return, the coefficients are -0.99% for S&P raw return and -1.07% for S&P excess return monthly. In sum, Table 2 indicates that the relation between money illusion and stock market returns is consistently negative.

1.4.2 Multivariate Regression

To examine whether money illusion has incremental power to predict market returns, I include three predictive variables related to interest rates. The variables are: T-bill is the 3-month T-bill rate. Term is the difference between yield on 10-year bond and the T-bill. Default is the difference between Baa and Aaa-rated corporate bonds.

Table 3 presents the results of multivariate regressions. Panel A reports the results over the periods 1965-2010 and Panel B reports the results over the sub-period 1970-1990. I use four measures of stock market returns: the value-weighted raw returns, the value-weighted excess returns, the S&P 500 raw returns, and the S&P excess return. The independent variable, money illusion, is standardized to have zero mean and unit variance, in order to interpret the economic significance of the predictability. I find that the estimates on money illusion remain negative and significant. The magnitudes of the coefficient on money illusion are almost same in the univariate regression: a one standard deviation increase in Inflation is associated with the 0.4% decrease in one-month-ahead market returns. These results indicate that adding interest variables has little effect on the ability of money illusion to predict returns. In Panel B, I perform sub-period analysis. The results are similar. The adjusted R^2 in the multivariate regressions ranges from 8.9% to 10.1%, higher than those in the univariate regressions. In sum, money illusion remains a negative predictor of stock market returns.

1.4.3 Money Illusion and Anomaly

I find that money illusion is a negative predictor for stock market returns during the period of 1965-2010. These findings suggest that investors may overestimate the upside potential of stock returns following high inflation periods. The key explanation of money illusion effects is that, following high inflation periods, money-illusioned investors are overly optimistic for the past performance of equities and excessively extrapolate into the future when they value firms. This valuation error can induce significant impacts in market prices.

To test whether money illusion leads to mispricing in the stock market, I entertain the possibility that anomalies at least partially reflect mispricing. In previous studies, Stambaugh, Yu, and Yu (2012) explore the role of investor sentiment in a broad set of anomalies in cross-sectional stock returns. Similar to Stambaugh, Yu, and Yu (2012), I examine the relation between money illusion and anomaly-based strategies.

1.4.3.1 Anomaly- based Strategy

I consider 11 well-documented anomalies to explore the money illusion-driven mispricing. Theses anomalies include size, value (book-to-market equity), financial distress, net stock issues, earnings quality, gross profitability, ROA (return on assets), investment-to-assets, external financing, and asset turnover. The explanation for each anomaly is as follows:

Size: Banz (1981) first documents the size effect by showing that small firms had higher risk-adjusted returns than large firms during the 1936-1977 period. Essentially, this anomaly indicates that small capitalization stocks outperform large capitalization stocks.

Value: Rosenberg, Reid, and Lanstein (1985) first suggest the value (book-to-market) strategy. This strategy is well-described in Fama and French (1993) that high book-to-market firms earn more than low book-to market firms.

Financial distress: Campbell, Hilscher, and Szilagyi (2008) find that firms with high financial distress have lower subsequent returns. The failure probability (financial distress) is estimated by a dynamic logit model with both accounting and equity market variables.

O-score: Ohlson (1980) O-score yields a similar anomaly to Campbell, Hilscher, and Szilagyi (2008). Ohlson's O-score is measured by the probability of default in a static model using various accounting variables.

Net stock issues: Pontiff and Woodgate (2008) present that there is a negative cross-sectional relation between aggregate share issuance and stock returns. Fama and French (2008) also present that net stock issuers earn negative realized returns.

Earnings quality: Sloan (1996) shows that firms with high accruals earn lower returns than firms with low accruals. Total accruals are calculated as changes in noncash working capital minus depreciation expense scaled by total assets.

Gross profitability: Novy-Marx (2013) finds that more profitable firms have higher returns than less profitable firms. It is calculated by gross profits scaled by assets.

Return-on-assets: Chen, Novy-Marx, and Zhang (2011) show that firms with higher past return on assets earn abnormally higher subsequent returns. Return on assets is measured by earnings before extraordinary items scaled by assets.

Investment-to-assets: Titman, Wei, and Xie (2004) find that higher past investment predicts abnormally lower future returns. Investment-to-assets is measured as the annual change in gross property, plant, and equipment plus the annual change in inventories scaled by the lagged book value of assets.

External financing: Bradshaw, Richardson, and Sloan (2006) find that net overall external financing is negatively related to stock returns. This negative relation suggests that investors may be relatively overoptimistic in forming their earnings expectations for high net external financing firms. External financing is measured by as the net amount of cash a firm raises from equity and debt markets.

Asset turnover: Novy-Marx (2013) find that high asset turnover firms have higher average returns. Asset turnover is often regarded as a proxy of efficiency, which quantify the ability to generate sales. Asset turnover is measured as sales-to-assets.

For each of the 11 anomalies, I examine the strategy that goes long the stocks in the highest-performing decile and short the stocks in the lowest-performing decile. Every portfolio formation on month, I sort stocks into the decile portfolios based on anomaly variables. I then construct a long-short strategy using the extreme decile, 1 and 10, with the long leg being the highest-performing decile and the short leg being the lowest-performing decile.

1.4.3.2 Anomaly Returns: High vs. Low Inflation

Table 4 presents excess monthly returns on a broad set of anomaly-based strategy following high or low inflation periods. I fist classify returns on each month either a high inflation period or a low inflation period. The high inflation period is one in which the value of money illusion index in the previous month is above the median value for the sample period. The low inflation period is the one below the median value.

The first hypothesis indicates that anomalies are stronger following high inflation periods. This suggests that stocks should earn relatively low (high) returns following high (low) inflation periods. Accordingly, the long-short spread should be larger following high inflation than low inflation. The positive profit on each long-short strategy reflects the unexplained cross-sectional difference in average returns that constitutes an anomaly. Table 4 clearly shows that the average excess returns are lower following high inflation periods. All of the values in 'High-Low' columns are negative and statistically significant. The last three columns in Table 4 present that each of the long-short strategy shows higher average returns following high inflation. All of the values in the last column are positive and statistically significant. The combined long-short spread earns 123 bps per month following high inflation. These results imply that mispricing is stronger following high inflation periods.

The second hypothesis indicates that the stocks in short leg should be more overpriced following high inflation. To the extent that an anomaly reflects mispricing, the profits of the long-short strategy represent relatively greater overpricing of stocks in the short leg. Thus, according to the second hypothesis, the returns on the short leg are lower following high inflation periods. In Table 4, the short leg of all anomaly strategies show a lower excess returns following high inflation periods. All of the values are statistically significant and reject the null hypothesis of no difference between high and low inflation periods. In Table 4, the short leg of the combined strategy earns 177 bps less per month following high inflation periods than low inflation periods. These results indicate that stocks in short leg are relatively overpriced following high inflation. These findings suggest that investors may overestimate the upside potential of stock returns following high inflation periods, inducing the money illusion-driven overpricing.

Overall, the results in Table 4 provide strong support for the first hypothesis and the second hypothesis. This evidence implies the possibility of money illusion-driven overpricing, suggesting that investors excessively extrapolate past performance of stocks and are subsequently experience negative returns.

1.4.3.3 Predictive Regression

Similar to Stambaugh, Yu, and Yu (2012), I use predictive regressions to examine whether money illusion predicts anomaly returns. The first hypothesis predicts a positive relation between the long-short spread and money illusion. Consistent with this prediction, the estimates for the spreads are positive in both Table 5 and Table 6. In Table 5, ten of 11 anomalies are statistically significant, and one of anomaly, which shows a negative prediction, is not significant. The money illusion index is scaled to have zero mean and unit standard deviation. Therefore, the slope coefficient of 0.0081 for the combination strategy indicates that one standard deviation increase in money illusion is associated with $0.0081 of additional profit monthly on a long-short strategy with $1 in each leg. In Table 6, ten of 11 anomalies are statistically significant. The estimate of combination strategy indicates that one standard deviation increase in money illusion is associated with $0.0061 of an additional monthly profit in each long-short spread.

The second hypothesis predicts a negative relation between the returns on the shot-leg portfolio and the lagged money illusion level. Consistent with this prediction, the slope coefficients for the short-leg returns of all anomalies are negative in both Table 5 and Table 6. In Table 5, all t-statistics are significant. The combination strategy indicates that one standard deviation increase in money illusion is associated with 0.8% decrease in monthly excess return on the short-leg portfolio. In Table 6, ten out of 11 estimates are significant. The combination strategy implies that one standard deviation increase in money illusion is related to 0.6% decrease in monthly excess return on the short-leg portfolio.

To access the estimated model in terms of bias and efficiency, I use the robust Hausman test. The robust Hausman statistics on short-leg combination strategy is 1.20 (p-value=0.2741), indicating the main specification is appropriate. Given this consistency, I use heteroskedasticity and auto-correlation consistent standard errors for *t*-statistics.

In sum, results from predictive regressions reported in Table 5 and Table 6 suggest that money illusion lead to overpricing in the stock market. Overall results are consistent with the findings in Table 2 and Table 3 that investors overestimate the upside potential of stock returns following high inflation periods. The key explanation is that, following high inflation periods, money-illusioned investors are overly optimistic for the past performance of equities and excessively extrapolate into the future when they value firms. These findings indicate money illusion plays an important role in affecting the degree of mispricing in the stock market.

1.4.3.4 Alternative Money Illusion Index

Overall, the results support the empirical implication that high inflation induces overpricing. This indicates that the money-illusioned investors are overly optimistic following high inflation periods, as a result, produce grater mispricing effects on prices. An alternative explanation for these results is that the money illusion index (i.e. the percentage change of Consumer Price Index) by itself is asymmetric with the period of high inflation. Under this explanation, the mispricing following high inflation periods simply reflect more strong inflation effects during those periods. To address whether the results reflect pricing asymmetry or inflation index asymmetry, I use the alternative measure of money illusion to examine the anomaly returns.

Table 7 presents the results of regressions on the alternative money illusion index. The alternative money illusion index is the inflation expectation, measured by median expected price change next 12 months by Survey of Consumers. The data is obtained from FRED and the source of data is from University of Michigan Inflation Expectation.[14] The sample period is from 1978 to 2010. The alternative money illusion index is scaled to have zero mean and unit standard deviation.

The alternative money illusion index show consistent implications with previous results. In Table 7, ten of 11 anomalies are positive and eight of 11 anomalies are statistically significant. The estimate of combination strategy indicates that one standard deviation increase in money illusion is associated with $0.0092 of an additional monthly profit in each long-short spread. The results with the alternative money illusion index also support the second hypothesis that money illusion is negatively associated with the returns on the shot-leg. In Table 7, all slope coefficients for the short-leg returns are negative and seven of 11 anomalies are statistically significant. The combination strategy indicates that one standard deviation increase in money illusion is associated with 0.8% decrease in monthly excess return on the short-leg portfolio.

[14] Web address: http://research.stlouisfed.org/fred2/series/MICH

In sum, results from predictive regressions reported in Table 7 show consistent results with Table 5 and Table 6, suggesting that previous results are not driven by asymmetry in inflation index by itself. These results provide a strong support for the possibility of money illusion-driven overpricing that money-illusioned investors overestimate the upside potential of stock returns following high inflation periods.

1.5 A Source of Money Illusion-Driven Mispricing

In this section, I investigate the source of money illusion-driven mispricing by testing two prominent explanations. The sources of money illusion-driven mispricing are two-fold: One is based on risk and the other one is based on behavioral explanation. The risk-based explanation argues that the stock returns reflect compensation for risk, indicating the risk premium would be correlated with some aspect of macroeconomic conditions. The behavioral-based explanation argues that investors excessively extrapolate on past performance when they value firms and subsequently surprised by the negative returns.

1.5.1 Risk-Based Explanation

The risk-based explanation argues that the stock returns reflect compensation for risk, indicating the risk premium would be correlated with some aspect of macroeconomic conditions. It is challenging to explain why there is a difference in loadings between long and short legs. To explain this difference, the risk-based explanation suggests the possibility of an omitted risk factor to which each short leg is sensitive but each long leg is not. In this regard, the risk-based explanation argues that the omitted risk factor's premium may explain the required correlation with money illusion.

To access the potential for a risk-based explanation for previous results, I control for an additional set of macro-related variables that seem reasonable to entertain as being correlated with the risk premium. I control for yield premium, term premium, and default premium. The yield premium is the 3-month T-bill rate. The term premium is the difference between yield on 10-year bond and the T-bill. The default premium is the difference between Baa and Aaa-rated corporate bonds. Table 8 reports the results regressing excess returns on money illusion and macro-variables. In Table 8, I find that nine of 11 anomalies are positive and statistically significant. The estimate of combination strategy indicates that one standard deviation increase in money illusion is associated with $0.0050 of an additional monthly profit in each long-short spread. Also, slope coefficients for the short-leg returns are negative in eight out of 11 anomalies. The combination strategy indicates that one standard deviation increase in money illusion is associated with 0.28% decrease in monthly excess return on the short-leg portfolio.

I also control for firm level predictive variables in addition to macro-variables. The firm level predictive variables are earnings-to-price ratio, the dividend-to-price ratio, and the equity variance. Importantly, in Table 9, I find that the predictive power of money illusion for anomaly returns does not weaken after I control for macro-variables and firm level predictive variables. In Table 9, ten of 11 anomalies are positive and statistically significant. The estimate of combination strategy indicates that one standard deviation increase in money illusion is associated with $0.0042 of an additional monthly profit in each long-short spread. Also, slope coefficients for the short-leg returns are negative in nine out of 11 anomalies and nine of 11 anomalies are statistically significant. The combination strategy indicates that one standard deviation increase in money illusion is associated with 0.2% decrease in monthly excess return on the short-leg portfolio.

To summarize the findings in Table 8 and Table 9, the results suggest that the effect of money illusion remains largely unchanged after control for additional variables. The coefficient and *t*-statistics are consistent with the main results in Table 5 and Table 6, in which the additional variables are not included.

1.5.2 Behavioral-Based Explanation

The behavioral-based explanation argues that investors may overestimate the upside potential of stock returns following high inflation periods, inducing the money illusion-driven mispricing. The key explanation of money illusion effects is that, following high inflation periods, money-illusioned investors are overly optimistic for the past performance of equities and excessively extrapolate into the future when they value firms.

To access the potential for a behavioral-based explanation for previous results, I investigate the relation between earnings forecast and money illusion. To examine the relation between forecast errors and money illusion, I first obtain the 12-month-ahead target-price forecasts for all individual analysts from the I/B/E/S database and aggregate the target-prices for each calendar month. Then, I obtain the actual stock prices realized in 1-year from the CRSP database, and define a variable forecast errors as the absolute value of the percentage difference between the realized stock price and the 1-year-ahead target price forecast. In addition, I obtain firms' financial accounting information from the COMPUSTAT database and calculate the log total assets, financial leverage, market-to-book ratio, ROA, and R&D-to-asset ratio. This approach is consistent with the analyst forecast literature.

I begin my analysis to fit regression specifications using forecast errors and money illusion with year and month fixed effects. I control for other factors being documented in prior research that can also influence analyst forecast behavior, such as firm size (log total assets), profitability (ROA), leverage (asset to equity ratio), growth opportunity (market to book ratio), and investment (R&D expense to asset ratio). Table 10 reports results of regressing forecast errors on money illusion index. I break down the sample to two subsamples: high-performance firms and low-performance firms. I find the negative coefficients on money illusion for the high-performance firms. This result indicates that investors' ex-ante expectation of future performance was too optimistic compared with the realized performance. Overall, results suggest that money-illusioned investors tend to overestimate the upside potential of stock returns following high inflation periods.

To clarify the role of dispersion in investors' views, I examine the relation between forecast dispersion and money illusion. The forecast dispersion is defined as the standard deviation of all analyst forecasts of 1-year-ahead target-price scaled by the average target-price for each firm. Table 11 reports results of regressing forecast errors on money illusion index. I find the negative coefficients on money illusion index. These results indicate that investors' views are more dispersed following low inflation. The results are consistent with the prediction of Stambaugh, Yu, and Yu (2012) that investors' views must be sufficiently disperse to include rational valuation when sentiment is low.

In sum, I find that money illusion negatively predicts forecast errors and forecast dispersion. These results suggest that money-illusioned investors are overly optimistic for the past performance of equities and excessively extrapolate into the future when they value firms.

1.6 Money Illusion, Sentiment, and Cross-Sectional Stock Returns

Overall, the results suggest that money-illisioned investors excessively extrapolate past performance into future and are subsequently experience return reversal. These findings are consistent with previous literatures by Delong, Shleifer, Summers, and Waldman (1990), Baker and Wurgler(2007) and Stambaugh, Yu, and Yu (2012). In this section, I extend the exploration of money illusion effects by examining sentiment and other commonly use measure for predicting stock returns.

Baker and Wugler (2006) provide strong evidence that investor sentiment have significant effects on the stock returns. Moreover, Stambaugh, Yu, and Yu (2012) find evidence that anomaly returns are larger following high levels of sentiment. These previous studies indicate that sentiment captures market-wide impacts in the stock market. Thus, to investigate whether money illusion plays an important and complementary role in cross-sectional stock returns, I control for the effect of sentiment first. The sentiment index is obtained from Baker and Wurgler (2006). Table 12 reports results of regressing benchmark-adjusted anomaly returns on money illusion index and Baker and Wugler sentiment index. The sentiment index is scaled to have zero mean and unit standard deviation. The results in Table 12 are consistent with the findings in Stambaugh, Yu, and Yu (2012). Each anomaly is stronger following high levels of sentiment and is mainly due to the overpricing of short legs.

Importantly, focusing on the coefficient, b_1, where money illusion is used as the explanatory variable, I find that the predictive power of money illusion for anomaly returns does not weaken after I control for the sentiment index. In Table 12, nine of 11 anomalies are positive and statistically significant. The estimate of combination strategy indicates that one standard deviation increase in money illusion is associated with $0.0073 of an additional monthly profit in each long-short spread. Also, slope coefficients for the short-leg returns are negative in ten out of 11 anomalies and nine of 11 anomalies are statistically significant. The combination strategy indicates that one standard deviation increase in money illusion is associated with 0.7% decrease in monthly excess return on the short-leg portfolio. These results suggest that money illusion has the complementary power for predicting anomaly performance, indicating that money illusion provides new information beyond investor sentiment.

In addition to sentiment index, I control for an additional set of macro-related variables that seem reasonable to entertain as being correlated with the risk premium. I control for yield premium, term premium, and default premium. The yield premium is the 3-month T-bill rate. The term premium is the difference between yield on 10-year bond and the T-bill. The default premium is the difference between Baa and Aaa-rated corporate bonds. I also control for firm characteristic variables. They are earnings-to-price ratio, the dividend-to-price ratio, and the equity variance. Table 13 reports the results regressing excess returns on money illusion, sentiment, macrovariables, and other firm characteristic variables. In Table 13, focusing on the coefficient, b_1, I find that nine of 11 anomalies are positive and statistically significant. The estimate of combination strategy indicates that one standard deviation increase in money illusion is associated with $0.0067 of an additional monthly profit in each long-short spread. Also, slope coefficients for the short-leg returns are negative in nine out of 11 anomalies. The combination strategy indicates that one standard deviation increase in money illusion is associated with 0.49% decrease in monthly excess return on the short-leg portfolio.

In sum, the effect of money illusion remains largely unchanged after controlling for sentiment and additional variables. These results suggest that money illusion plays an important role in affecting the degree of mispricing in the stock market and provides the complementary power to explain the cross-sectional stock returns.

1.7 Simple Model

In the presence of money illusion and short-sale constraints, the potential disagreement between investors can lead overpricing. To the extent that judgment fallacies may affect some investors but not others, or may differ across investors, heterogeneity of investor beliefs can be sustained as an equilibrium phenomenon, and this in turn can affect asset prices in surprising ways. One characteristic of the asset market is that different investors may interpret the same information in different ways. Much of the public information such as inflation is subjective in nature and open to different interpretations by investors. To better understand the interactions among inflation, beliefs, and asset prices, I suggest a theoretical model that highlights overpricing of stock returns.

1.7.1 Set up

This model is a simple variation on the Harrison and Kreps (1978) and Morris (1996) model of speculative pricing in asset markets, where the key maintained assumption are risk neutral investors, adequate liquidity, and short-selling constraints. To set up asset market to test the theory of money illusion-driven overpricing, I impose short sales constraints and endow investors with a lot of liquidity so that liquidity constraints do not bind.

1.7.2 Investors and Heterogeneous Beliefs

Assume that all investors use a common Bayesian updating rule, based on the true stochastic process generating the signals. *q* is common knowledge and all investors update using Bayes rule.

Let π_t be the common posterior that the state of the world is A after S_t is revealed in period *t*. [15] Given ρ_t, the common posterior if $s_t = \alpha$ is

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[15]There are two possible states of the world, A and B. The probability of A being world is p. Nature chooses the state of the world. There is an asset market with *t+1* trading periods and *i* risk-neutral investors. There is one type of asset in this market that pays off H per unit if A is the state of the world and L(<H) per unit if B is the state of the world. Investors observe either a sequence of public signals, one at the beginning of each trading period after the first. I assume the signals are generated by a stochastic process that is independent across periods, conditional on the state. If $\omega = \mathrm{A}$, then $s_t = a$ with probability q>0.5 and $s_t = b$ with probability 1-q. Likewise, when $\omega = \mathrm{B}$, $s_t = b$ with probability q>0.5 and $s_t = a$ with probability 1-q. In the initial period, investors receive no information about the state of the world. Since the asset pays off only in state A, I refer to a signal $s_t = a$ as high inflation and a signal $s_t = b$ as low inflation.

$$\pi_t(\rho_t | s_t = a) = \frac{q\rho_t}{q\rho_t + (1-q)(1-\rho_t)}$$

and the common posterior if $s_t = b$ is

$$\pi_t(\rho_t | s_t = b) = \frac{(1-q)\rho_t}{(1-q)\rho_t + q(1-\rho_t)}$$

Given that the asset pays off 1 in state A and 0 in state B, and given that all investors are risk neutral, this common posterior at period *t* is also the valuation of the asset at period *t*. In this model, each investor thinks her own belief is correct. Investors have own expectations about the distribution of future prices, and disagree about the fundamental value of asset.

I consider a continuum of investor types characterized by the parameter $\theta \in [0, \infty]$. An investor with type θ_i will treat a public signal (i.e. inflation) as if it had the informational equivalent of θ independent signals, each of informativeness *q*. Thus, θ_i measures how much investor *i* under-react $(\theta_i < 1)$ or over-react $(\theta_i > 1)$ to the public signal, relative to *q*. Over-reaction to signals is sometimes referred to neglect, and under-reaction is sometimes referred to as conservatism.

Let π_t be investor *i*'s posterior that the state of world is A after st is revealed in period *t*. This updated posterior after observing $s_t = A$ for an investor of type θ_i is:

$$\pi_{it}^{\theta i}(\rho_{it} | s_t = A) = \frac{q^{\theta i}\rho_{it}}{q^{\theta i}\rho_{it} + (1-q)^{\theta i}(1-\rho_{it})}$$

and after observing $s_t = B$ is

$$\pi_{it}^{\theta i}\left(\rho_{it}\middle|s_t = B\right) = \frac{(1-q)^{\theta i}\rho_{it}}{(1-q)^{\theta i}\rho_{it} + q^{\theta i}(1-\rho_{it})}$$

1.7.3 Equilibrium Price and Overpricing

I maintain the assumptions of binding short sale constraints and sufficient liquidity among the investors to hold all the assets. Under these assumptions, I can apply the logic of the Morris (1996) model to characterize the equilibrium price dynamics in our model. Given the way I have defined different investors' types, and given that the initial prior belief is 0.5, the private posterior and equilibrium prices will depend only on the investor types, the period number, *t*, and the number of signals, $h \leq t$. Thus, I can denote the current belief of investor type θ_i by

$$\pi_{it}^{\theta i}(h) = \frac{q^{\theta_i h}(1-q)^{\theta_i(t-h)}}{q^{\theta_i h}(1-q)^{\theta_i(t-h)} + q^{\theta_i(t-h)}(1-q)^{\theta_i h}}$$

Define $\pi_t^*(h) = \max_{i\in I}\{\pi_{it}^{\theta_i}(h)\}$ to be the most optimistic belief amongst the investors at period *t* about A being the state of the world. The corresponding θ type for the investors with the most optimistic belief is denoted θ^*. The price of the asset period t given the history of public signals must be equal to the highest expect return of holding it to the next period *t+1* in equilibrium.

Let $\varphi_t^*(h)$ be the most optimistic belief about the likelihood of good news being announced in period *t+1*, after h good news signals and *t-h* bad news signals,

$$\varphi_t^*(h) = \pi_t^*(h)(\frac{q^{\theta^*}}{q^{\theta^*}+(1-q)^{\theta^*}})+(1-\pi_t^*(h)(\frac{(1-q)^{\theta^*}}{q^{\theta^*}+(1-q)^{\theta^*}})$$

Note investors can only update their beliefs and asset valuations based on the sequence of signals revealed so pricing depends upon the signals revealed and expectations about future signals. The θ type with the most optimistic belief about the state of the world being A also has the most optimistic belief about the next guess being A. Now I can specify the equilibrium price

$$P_t(h) = \varphi_t^*(h)P_{t+1}(h+1) + \left(1-\varphi_t^*(h)\right)P_{t+1}(h+1)$$

Therefore, I can define the speculate overpricing, $\alpha_t(h) = P_t(h) - P_t^*(h)$. *h* is the number of guesses about the high pay off state being realized. The speculative overpricing is the amount by which the price exceeds the maximal valuation of all investors. This overpricing is the different between the price and the most optimistic valuation. The price would reflect only the belief of the most optimistic investor or possible exceed the valuations of all of the investors when there is a speculative premium.

Recall that a continuum of investor types is characterized by the parameter $\theta \in [0,\infty]$. Following Morris (1996), I compare the price in each period to the investors' valuations and derive several results. A permanent optimist has the highest probabilistic belief of A being the state of the world out of all investors for every continuation sequence of signals (high inflation) until the end of the market. Accordingly, speculate overpricing, $\alpha_t(h) = P_t(h) - P_t^*(h)$, is the amount by which the price exceeds the maximal valuation of all investors.

This implies that overpricing is more likely during high-inflation. The main prediction of theoretical model is that, following high inflation periods, the most optimistic views about stocks tend to be overly optimistic, as a result, stocks tend to be overpriced. In contrary, during low inflation periods, the most optimistic views about stocks tend to be those of rational investors, and thus overpricing during those periods is less likely. This would be consistent with the money illusion-driven overpricing for the short portfolio stocks.

1.8 Conclusion

In this study, I investigate whether money illusion deludes investors, as a result, leads to mispricing in the stock market. Numerous researches have examined the existence of money illusion in the capital market and find that the impact of money illusion is crucial on the economy. Motivated by early works and recent renewed interests in money illusion, I examine whether inflation plays an important role in affecting the degree of mispricing in the equity market.

To the extent that anomalies reflect mispricing, I test whether money illusion predicts anomaly returns. I find that anomalies are stronger and the returns on the short-leg portfolio of each anomaly are lower following high inflation periods. These findings indicate that money-illusioned investors overestimate the upside potential of stock returns following high inflation and subsequently experience the return reversal. To the best of my knowledge, this is the first paper to examine the relation between money illusion and anomaly returns.

Furthermore, I explore the source of money illusion-driven mispricing. I find that money illusion negatively predicts forecast errors and dispersion. The findings imply that, following high inflation periods, investors are overly optimistic for the past performance of equities and excessively extrapolate into the future when they value firms. This indicates that the behavioral-based explanation may support the results of this study.

I extend the exploration of money illusion effects by examining sentiment and other commonly use measure for predicting stock returns. I find that the effect of money illusion remains largely unchanged after controlling for many additional variables. The results suggest that money illusion can provide the complementary power for cross-sectional stock returns beyond the commonly used variables. Overall, this study contributes to the literatures on money illusion and mispricing by providing novel evidence that money illusion can lead to mispricing in the stock market.

Figure1.1 Money Illusion and CPI (Consumer Price Index)

This figure plots *money illusion* and CPI (Consumer Price Index) from 1965 and 2010. *money illusion* is defined as the percentage change in CPI. The data for CPI is obtained from the Bureau of Labor Statistics.

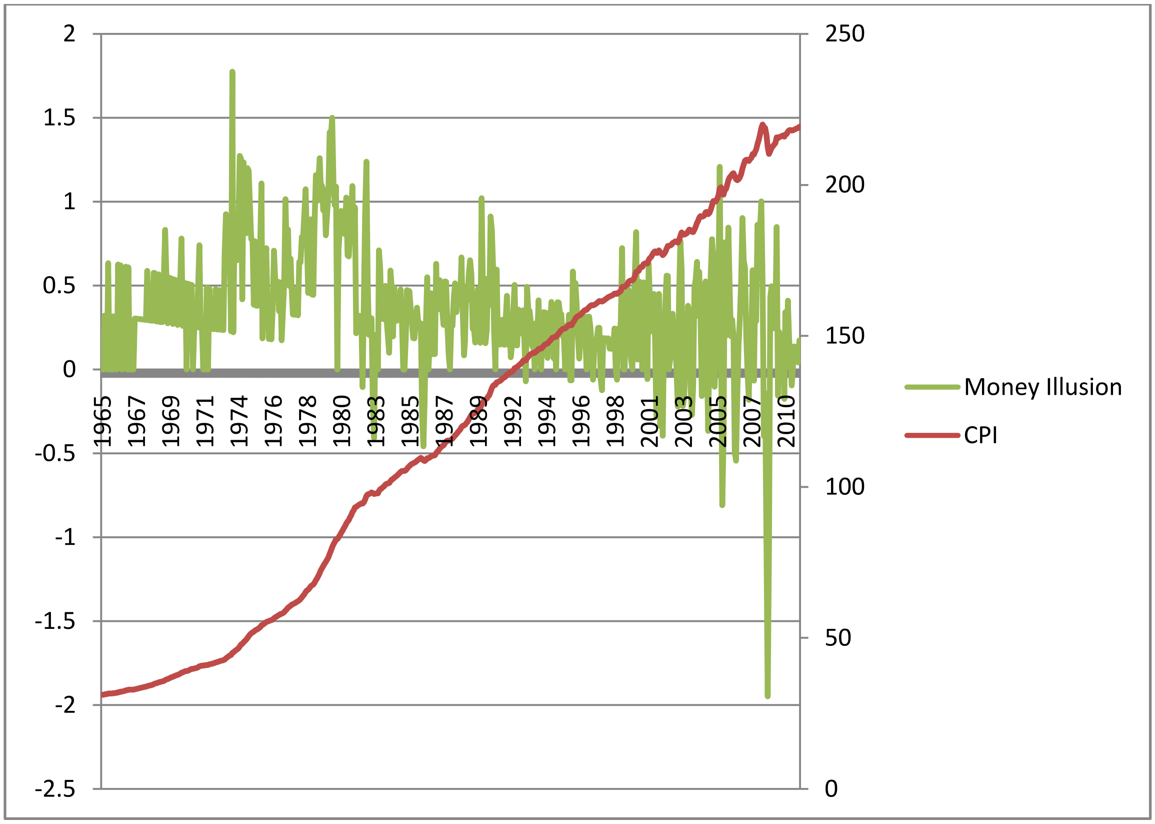

Table 1.1 Descriptive Statistics for Money Illusion and Stock Market Returns

The table reports the descriptive statistics for money illusion and stock market returns. Four measures of stock market returns are used: the value-weighted raw returns, the value-weighted excess returns, the S&P 500 raw returns, and the S&P excess return. Stock market returns are computed monthly. Money illusion is defined as the percentage change in Consumer Price Index (CPI) from year *t-1* to *t*. The sample period is from 1965 to 2010. The entire sample size is 2,131,852.

Panel A: Descriptive Statistics

Variable	Mean	Std.dev	Median
Money Illusion	0.0035	0.0036	0.0030
Value-weighted raw returns	0.0087	0.0458	0.0122
Value-weighted excess returns	0.0043	0.0459	0.0077
S&P 500 raw returns	0.0059	0.0442	0.0087
S&P 500 excess return	0.0014	0.0443	0.0048

Panel B: Correlation

Variable	Value-weighted raw returns	Value-weighted excess returns	S&P 500 raw returns	S&P excess return
Value-weighted raw returns	1			
Value-weighted excess returns	0.9986	1		
S&P 500 raw returns	0.9858	0.9844	1	
S&P 500 excess return	0.9843	0.9858	0.9985	1
Money Illusion	-0.0930	-0.1157	-0.1033	-0.1268

Table 1.2 Univariate Regression: Money Illusion and Stock Market Returns

The table reports the predictive regression of one-month-ahead stock market returns on the inflation. Panel A report the results for the full sample period 1965-2010 and Panel B reports results for the subsample period 1970-1990. Four measures of stock market returns are used: the value-weighted raw returns, the value-weighted excess returns, the S&P 500 raw returns, and the S&P excess return. Money illusion is defined as the percentage change in Consumer Price Index (CPI) from year *t-1* to *t*. The inflation variable is standardized to have zero mean and unit variance. *t*-statistics are in parenthesis with ***, ** and * indicating its statistical significant level of 1%, 5% and 10% respectively.

Panel A: 1965-2010				
	Value-weighted raw returns	Value-weighted excess returns	S&P 500 raw returns	S&P 500 excess return
Money Illusion	-0.00426**	-0.00531***	-0.00457**	-0.00562***
	(-2.19)	(-2.73)	(-2.44)	(-3.00)
Intercepts	0.00873***	0.00426**	0.00588***	0.00142
	(4.49)	(2.19)	(3.14)	(0.76)
adj. R^2	0.007	0.012	0.009	0.014

Panel B: 1970-1990				
	Value-weighted raw returns	Value-weighted excess returns	S&P 500 raw returns	S&P 500 excess return
Money Illusion	-0.00969***	-0.0105***	-0.00989***	-0.0107***
	(-3.14)	(-3.39)	(-3.34)	(-3.59)
Intercepts	0.0134***	0.00759**	0.0103***	0.00450
	(4.09)	(2.31)	(3.27)	(1.42)
adj. R^2	0.034	0.040	0.039	0.045

Table 1.3 Multivariate Regression: Money Illusion and Stock Market Returns

The table reports the predictive regression of one-month-ahead stock market returns on the inflation and other return predictors. Panel A report the results for the full sample period 1965-2010 and Panel B reports results for the subsample period 1970-1990. Four measures of stock market returns are used: the value-weighted raw returns, the value-weighted excess returns, the S&P 500 raw returns, and the S&P excess return. Money Illusion is defined as the percentage change in Consumer Price Index (CPI) from year *t-1* to *t*. The inflation variable is standardized to have zero mean and unit variance. *t*-statistics are in parenthesis with ***, ** and * indicating its statistical significant level of 1%, 5% and 10% respectively.

Panel A: 1965-2010				
	Value-weighted raw returns	Value-weighted excess returns	S&P 500 raw returns	S&P 500 excess return
Money Illusion	-0.00416*	-0.00413*	-0.00463**	-0.00461**
	(-1.88)	(-1.87)	(-2.17)	(-2.16)
T-bill	0.000371	-0.000427	0.000493	-0.000305
	(0.41)	(-0.48)	(0.57)	(-0.35)
Term	0.00137	0.00140	0.00136	0.00139
	(0.72)	(0.74)	(0.74)	(0.76)
Default	0.00467	0.00460	0.00272	0.00265
	(0.98)	(0.96)	(0.59)	(0.58)
Intercept	-0.000354	-0.000425	-0.00177	-0.00184
	(-0.05)	(-0.07)	(-0.28)	(-0.29)
adj. R^2	0.006	0.012	0.007	0.012

Panel B: 1970-1990				
	Value-weighted raw returns	Value-weighted excess returns	S&P 500 raw returns	S&P 500 excess return
Money Illusion	-0.00643*	-0.00642*	-0.00696**	-0.00695**
	(-1.79)	(-1.78)	(-2.00)	(-2.00)
T-bill	-0.00448***	-0.00526***	-0.00425***	-0.00504***
	(-2.70)	(-3.18)	(-2.66)	(-3.15)
Term	-0.00451	-0.00448	-0.00439	-0.00436
	(-1.43)	(-1.42)	(-1.44)	(-1.43)
Default	0.0374***	0.0372***	0.0340***	0.0339***
	(4.28)	(4.27)	(4.04)	(4.02)
Intercept	0.00501	0.00493	0.00440	0.00433
	(0.39)	(0.39)	(0.36)	(0.35)
adj. R^2	0.092	0.101	0.089	0.099

Table 1.4 Anomaly Returns: High vs. Low Inflation

This table reports excess monthly returns on a broad set of anomaly-based strategies. I classify returns each month as following either a high-inflation or a low-inflation month. A high-inflation month is one in which the value of the money illusion index in the previous month is above the median value of sample period, and a low-inflation month is below the median values. *t*-statistics are in parenthesis.

Anomaly	Long-leg			Short-leg			Long-Short		
	High	Low	High-Low	High	Low	High-Low	High	Low	High-Low
Size	-0.0028	0.0004	-0.0032 (-3.19)	0.0080	0.0174	-0.0094 (-20.91)	-0.0108 (-16.59)	-0.0170 (-21.73)	0.0062 (6.07)
Book to Market	-0.0181	-0.0145	-0.0036 (-4.56)	-0.0110	0.0089	-0.0199 (-20.51)	-0.0071 (-9.22)	-0.0234 (-23.96)	0.0163 (13.02)
Financial Distress	0.0029	0.0055	-0.0026 (-2.60)	0.0150	0.0409	-0.0259 (-26.85)	-0.0121 (-13.36)	-0.0354 (-33.96)	0.0233 (16.90)
Ohlson's-O (Distress)	0.0048	0.0112	-0.0065 (-19.88)	-0.0213	0.0073	-0.0286 (-13.09)	0.0260 (33.41)	0.0039 (4.27)	0.0221 (17.91)
Net Stock Issues	-0.0015	0.0079	-0.0094 (-32.59)	0.0029	0.0145	-0.0116 (-15.09)	-0.0044 (-8.20)	-0.0065 (-11.30)	0.0021 (2.70)
Accrual	0.0039	0.0098	-0.0059 (-11.11)	0.0044	0.0156	-0.0112 (-15.88)	-0.0005 (-0.83)	-0.0058 (-8.77)	0.0053 (5.91)
Profitability	0.0191	0.0276	-0.0085 (-10.61)	-0.0154	0.0086	-0.0240 (-13.89)	0.0345 (30.47)	0.0190 (15.21)	0.0155 (9.05)
ROA	0.0170	0.0261	-0.0091 (-12.85)	-0.0245	-0.0022	-0.0223 (-14.68)	0.0415 (42.03)	0.0283 (24.66)	0.0131 (8.66)
Investment-to-assets	0.0059	0.0174	-0.0114 (-12.58)	-0.0071	0.0086	-0.0157 (-12.98)	0.0130 (13.63)	0.0088 (7.70)	0.0092 (6.19)
External Finance	0.0069	0.0141	-0.0072 (-5.90)	-0.0188	0.0052	-0.0240 (17.25)	0.0257 (20.88)	0.0089 (5.96)	0.0168 (8.71)
Asset Turnover	0.0041	0.0134	-0.0093 (-11.53)	-0.0049	0.0169	-0.0218 (-10.88)	0.0090 (7.39)	-0.0034 (-2.60)	0.0124 (6.90)
Combination	0.0047	0.0096	-0.0049 (-8.45)	-0.0031	0.0146	-0.0177 (13.21)	0.0078 (8.35)	-0.0050 (-4.53)	0.0128 (8.80)

Table 1.5 Predictive Regressions: Excess Returns on Long-Short Strategies

The table reports estimates of *b* in the regression

$R_{i,t} = a + bM_{t-1} + e_t$,

where $R_{i,t}$ is the excess return in month *t* on either the long leg, the short leg, or the difference, and M_t is the percentage of the money illusion index ($(CPI_t - CPI_{t-1})/CPI_{t-1}$). *t*-statistics are in parenthesis. *t*-statistics are computed using heteroskedasticity and auto-correlation consistent standard errors.

Anomaly	Long-leg	Short-leg	Long-Short
Size	-0.0006	-0.0036	0.0031
	(1.14)	(-10.68)	(5.93)
Book to Market	-0.0032	-0.0119	0.0087
	(-8.33)	(-27.36)	(14.11)
Financial Distress	0.0012	-0.0117	0.0129
	(2.39)	(-24.37)	(18.85)
Ohlson's O (Distress)	-0.0019	-0.0146	0.0127
	(-11.94)	(-24.34)	(20.26)
Net Stock Issues	-0.0049	-0.0043	-0.0006
	(-33.15)	(-11.33)	(-1.60)
Accrual	-0.0025	-0.0051	0.0026
	(-9.68)	(-16.65)	(5.96)
Profitability	-0.0027	-0.1204	0.0094
	(-6.46)	(-17.05)	(10.37)
ROA	-0.0044	-0.0128	0.0084
	(-12.49)	(-21.08)	(10.81)
Investment-to-assets	-0.0055	-0.0083	0.0028
	(-12.00)	(-15.41)	(3.72)
External Finance	-0.0030	-0.0125	0.0095
	(-5.13)	(-19.77)	(10.00)
Asset Turnover	-0.0047	-0.0140	0.0094
	(-11.70)	(-17.26)	(10.04)
Combination	-0.0003	-0.0084	0.0081
	(-0.84)	(-15.00)	(10.34)

Table 1.6 Predictive Regressions: Benchmark-adjusted Returns on Long-Short Strategies

The table reports estimates of *b* in the regression

$$R_{i,t} = a + bM_{t-1} + cMKT_t + dSMB_t + eHML_t + u_t,$$

where $R_{i,t}$ is the excess return in month *t* on either the long leg, the short leg, or the difference, and M_t is the level of the money illusion index (change of Consumer Price Index). *t*-statistics are in parenthesis. *t*-statistics are computed using heteroskedasticity and auto-correlation consistent standard errors.

Anomaly	Long-leg	Short-leg	Long-Short
Size	0.0041 (8.26)	-0.0004 (-1.18)	0.0045 (9.04)
Book to Market	0.00003 (0.08)	-0.0078 (-18.61)	0.0078 (13.24)
Financial Distress	0.0049 (10.48)	-0.0042 (-9.28)	0.0091 (14.16)
Ohlson's O (Distress)	-0.0005 (-3.22)	-0.0049 (-8.53)	0.0044 (7.37)
Net Stock Issues	0.0007 (5.16)	0.0010 (2.86)	-0.0003 (-0.76)
Accrual	-0.0003 (-1.32)	-0.0005 (-1.94)	0.0002 (0.59)
Profitability	0.0007 (1.71)	-0.0076 (-11.48)	0.0084 (9.77)
ROA	0.0002 (0.67)	-0.0052 (-8.97)	0.0054 (7.34)
Investment-to-assets	0.0002 (0.55)	-0.0037 (-7.14)	0.0039 (5.49)
External Financing	0.0010 (1.830	-0.0054 (-8.92)	0.0064 (7.06)
Asset Turnover	-0.0010 (-2.75)	-0.0055 (-7.01)	0.0044 (4.94)
Combination	0.0002 (0.74)	-0.0064 (-11.44)	0.0066 (8.43)

Table 1.7 Predictive Regressions: Alternative Money Illusion Index and Benchmark-adjusted Returns on Long-Short Strategies

The table reports estimates of *b* in the regression

$$R_{i,t} = a + bE_{t-1} + cMKT_t + dSMB_t + eHML_t + u_t,$$

where $R_{i,t}$ is the excess return in month *t* on either the long leg, the short leg, or the difference. E_t is the inflation expectation, measured by median expected price change next 12 months by Survey of Consumers. The data is obtained from FRED and the source of data is from University of Michigan Inflation Expectation. The sample period is from 1978 to 2010. *t*-statistics are in parenthesis. *t*-statistics are computed using heteroskedasticity and auto-correlation consistent standard errors.

Anomaly	Long-leg	Short-leg	Long-Short
Size	0.0014 (2.43)	-0.0005 (-1.41)	0.0019 (3.37)
Book to Market	-0.0002 (-0.38)	-0.0006 (-1.17)	0.0004 (0.61)
Financial Distress	0.0024 (4.43)	-0.0028 (-5.37)	0.0053 (6.98)
Ohlson’s O (Distress)	-0.0010 (-5.76)	-0.0022 (-3.48)	0.0012 (1.84)
Net Stock Issues	0.0010 (6.28)	-0.0005 (-1.20)	0.0015 (3.49)
Accrual	-0.0002 (-0.69)	-0.0016 (-5.07)	0.0014 (3.13)
Profitability	0.0012 (2.96)	-0.0034 (-4.89)	0.0046 (5.15)
ROA	0.0012 (3.06)	-0.0026 (-4.05)	0.0038 (4.51)
Investment-to-assets	0.0016 (3.47)	0.0003 (0.51)	0.0013 (1.64)
External Financing	0.0014 (2.17)	-0.0020 (-2.85)	0.0035 (3.20)
Asset Turnover	-0.0007 (-1.47)	-0.0004 (0.44)	-0.0003 (-0.26)
Combination	0.0011 (3.25)	-0.0081 (-13.90)	0.0092 (11.16)

Table 1.8 Predictive Regressions: Macro-variables and Benchmark-adjusted Returns on Long-Short Strategies

The table reports estimates of b_1 *and* b_2 in the regression

$$R_{i,t} = a + b_1M_{t-1} + cMKT_t + dSMB_t + eHML_t + Macro_t + u_t$$

where $R_{i,t}$ is the excess return in month *t* on either the long leg, the short leg, or the difference, and M_t is the level of the money illusion index (change of Consumer Price Index). *Macro is* macrovariables. They are *T-bill* as the 3-month T-bill rate, *Term* as the difference between yield on 10-year bond and the T-bill, and *Default* as the difference between Baa and Aaa-rated corporate bonds. *t*-statistics are in parenthesis. *t*-statistics are computed using heteroskedasticity and auto-correlation consistent standard errors.

Anomaly	Long leg	Short leg	Long-Short
Size	0.0009 (1.63)	0.0000 (0.02)	0.0009 (1.61)
Book to Market	0.0015 (-0.38)	-0.0048 (-10.30)	0.0063 (9.47)
Financial Distress	0.0027 (5.06)	-0.0041 (-8.12)	0.0068 (9.40)
Ohlson’s O (Distress)	0.0009 (5.65)	-0.0060 (-9.29)	0.0069 (10.24)
Net Stock Issues	0.0023 (14.35)	0.0021 (5.49)	0.0002 (0.40)
Accrual	0.0008 (2.97)	0.0004 (1.44)	0.0003 (0.73)
Profitability	0.0015 (3.59)	-0.0065 (-8.63)	0.0080 (8.43)
ROA	0.0010 (2.64)	-0.0053 (-8.04)	0.0063 (7.52)
Investment-to-assets	0.0012 (2.45)	-0.0020 (-3.57)	0.0032 (4.05)
External Financing	0.0018 (2.90)	-0.0045 (-6.64)	0.0063 (6.18)
Asset Turnover	0.0002 (0.50)	-0.0048 (-5.63)	0.0051 (5.10)
Combination	0.0022 (6.41)	-0.0028 (-4.72)	0.0050 (5.92)

Table 1.9 Predictive Regressions: Macro-variables, Other Firm Level Predictive Variables and Benchmark-adjusted Returns on Long-Short Strategies
The table reports estimates of *b* in the regression

$$R_{i,t} = a + b_1 M_{t-1} + cMKT_t + dSMB_t + eHML_t + Macro_t + Others_t + u_t$$

where $R_{i,t}$ is the excess return in month *t* on either the long leg, the short leg, or the difference, and M_t is the level of the money illusion index (change of Consumer Price Index). *Macro is* macro-variables. They are *T-bill* as the 3-month T-bill rate, *Term* as the difference between yield on 10-year bond and the T-bill, and *Default* as the difference between Baa and Aaa-rated corporate bonds. *Others* are other firm level predictive variables including the earnings-to-price ratio, the dividend-to-price ratio, and the equity variance. *t*-statistics are in parenthesis. *t*-statistics are computed using heteroskedasticity and auto-correlation consistent standard errors.

Anomaly	Long-leg	Short-leg	Long-Short
Size	0.0004 (0.64)	0.0003 (0.74)	0.001 (0.22)
Book to Market	0.0022 (5.04)	-0.0033 (-6.10)	0.0055 (7.48)
Financial Distress	-0.0006 (-0.96)	-0.0013 (-2.63)	0.0007 (0.92)
Ohlson's O (Distress)	0.0010 (6.40)	-0.0057 (-7.40)	0.0067 (8.47)
Net Stock Issues	0.0028 (16.77)	0.0023 (5.90)	0.0005 (1.26)
Accrual	0.0008 (3.08)	0.0009 (2.93)	-0.0001 (-0.28)
Profitability	0.0029 (6.63)	-0.0026 (-3.48)	0.0055 (5.75)
ROA	0.0013 (3.35)	-0.0037 (-5.09)	0.0050 (5.52)
Investment-to-assets	0.0020 (3.80)	-0.0012 (-2.02)	0.0032 (3.77)
External Financing	0.0013 (1.99)	-0.0037 (-5.00)	0.0050 (4.51)
Asset Turnover	0.0007 (1.57)	-0.0043 (-4.54)	0.0050 (4.64)
Combination	0.0022 (6.38)	-0.0020 (-3.34)	0.0042 (4.93)

Table 1.10 Money Illusion and Analyst Forecast Errors
The table reports estimates of *b* in the regression

$$Forecast\ errors_{i,t} = a + bM_{t-1} + Controls + u_t$$

where *Forecast errors*$_{i,t}$ are measured by the absolute difference between the realized stock price in one year and the forecasted target price divided by the average target price. M_t is the level of the money illusion index (change of Consumer Price Index). *Controls* are six variables including numbers of forecasts, log of total assets, market-to-book ratio, leverage, return-on-assets, R&D expenditure-to-assets. All specifications use year and month and industry fixed effects and firm-level clustered standard error. The sample period is from 1999-2010. *t*-statistics are in parenthesis with ***, ** and * indicating its statistical significant level of 1%, 5% and 10% respectively. *t*-statistics are based on the heteroskedasticity-consistent standard errors of White (1980).

	Full Sample	High-performing Firm	Low-performing Firm
Money Illusion	-0.0594	-5.229***	4.861***
	(-0.07)	(-2.75)	(28.80)
Year Fixed-effect	Yes	Yes	Yes
Month Fixed-effect	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes
adj. R-sq	0.020	0.027	0.196

Table 11. Money Illusion and Forecast Dispersion

The table reports estimates of *b* in the regression

$$Forecast\ dispersion_{i,t} = a + bM_{t-1} + Controls + u_t$$

where *Forecast dispersion*$_{i,t}$ is measured by the standard deviation of all analyst forecasted target prices divided by the average target price. M_t is the level of the money illusion index (change of Consumer Price Index). *Controls* are six variables including numbers of forecasts, log of total assets, market-to-book ratio, leverage, return-on-assets, R&D expenditure-to-assets. All specifications use year and month and industry fixed effects and firm-level clustered standard error. The sample period is from 1999-2010. *t*-statistics are in parenthesis with ***, ** and * indicating its statistical significant level of 1%, 5% and 10% respectively. *t*-statistics are based on the heteroskedasticity-consistent standard errors of White (1980).

	Full Sample	High-performing Firm	Low-performing Firm
Money Illusion	-2.118***	-1.283***	-1.283***
	(-25.00)	(-9.30)	(-9.30)
Year Fixed-effect	Yes	Yes	Yes
Month Fixed-effect	Yes	Yes	Yes
Clustered SE	Yes	Yes	Yes
adj. R-sq	0.125	0.097	0.097

Table 1.12 Predictive Regressions: Sentiment-adjusted Returns on Long-Short Strategies

The table reports estimates of b_1 *and* b_2 in the regression

$$R_{i,t} = a + b_1 M_{t-1} + b_2 Sentiment_{t-1} + cMKT_t + dSMB_t + eHML_t + u_{t,}$$

where $R_{i,t}$ is the excess return in month t on either the long leg, the short leg, or the difference, and M_t is the level of the money illusion index (change of Consumer Price Index). $Sentiment_t$ is the level of sentiment index of Baker and Wugler (2006). *t*-statistics are in parenthesis. *t*-statistics are computed using heteroskedasticity and auto-correlation consistent standard errors.

Anomaly	Long-leg		Short-leg		Long-Short	
	b_1	b_2	b_1	b_2	b_1	b_2
Size	0.0028	-0.0069	-0.0001	0.0017	0.0029	-0.0086
	(5.63)	(-13.41)	(-0.19)	(4.91)	(5.76)	(-16.58)
Book to Market	-0.0010	-0.0046	-0.0087	-0.0040	0.0077	-0.0006
	(-2.58)	(-12.11)	(-20.11)	(-9.15)	(12.63)	(-0.99)
Financial Distress	0.0030	-0.0088	-0.0040	0.0011	0.0070	-0.0099
	(6.24)	(-17.89)	(-8.57)	(2.45)	(10.57)	(-14.80)
Ohlson's O (Distress)	-0.0005	-0.0003	-0.0078	-0.0109	0.0073	0.0106
	(-3.42)	(-1.58)	(-13.25)	(-19.15)	(11.88)	(17.53)
Net Stock Issues	-0.0000	-0.0031	0.0005	-0.0045	-0.0005	0.0014
	(-0.01)	(-22.98)	(1.41)	(-10.86)	(-1.31)	(3.17)
Accrual	-0.0007	-0.0019	-0.0006	-0.0002	-0.0001	-0.0017
	(-2.84)	(-7.43)	(-2.01)	(-0.52)	(-0.25)	(-3.98)
Profitability	0.0007	0.0003	-0.0097	-0.0114	0.0104	0.0119
	(1.78)	(0.59)	(-14.17)	(-15.40)	(11.92)	(12.13)
ROA	0.0001	-0.0004	-0.0070	-0.0092	0.0072	0.0088
	(0.38)	(-1.26)	(-11.84)	(-15.92)	(9.46)	(11.68)
Investment-to-assets	-0.0006	-0.0038	-0.0054	-0.0081	0.0047	0.0043
	(-1.45)	(-8.51)	(-10.21)	(-15.10)	(6.47)	(5.84)
External Financing	-0.0004	-0.0065	-0.0070	-0.0094	0.0065	0.0029
	(-0.75)	(-11.10)	(-11.26)	(-14.22)	(6.99)	(3.01)
Asset Turnover	-0.0014	-0.0016	-0.0065	-0.0076	0.0051	0.0060
	(-3.52)	(-3.93)	(-8.24)	(-9.20)	(5.65)	(6.34)
Combination	-0.0001	-0.0023	-0.0074	-0.0072	0.0073	0.0049
	(-0.31)	(-6.58)	(-13.14)	(-11.54)	(9.23)	(5.55)

Table 1.13 Predictive Regressions: Sentiment, Macro-variables, and Other Variables

The table reports estimates of *b* in the regression

$$R_{i,t} = a + b_1 M_{t-1} + b_2 Sentiment_{t-1} + cMKT_t + dSMB_t + eHML_t + Macro_t + Others_t + u_t$$

where $R_{i,t}$ is the excess return in month *t* on either the long leg, the short leg, or the difference, and M_t is the level of the money illusion index (change of Consumer Price Index). $Sentiment_t$ is the level of sentiment index of Baker and Wugler (2006). *Macro is* macrovariables. They are *T-bill* as the 3-month T-bill rate, *Term* as the difference between yield on 10-year bond and the T-bill, and *Default* as the difference between Baa and Aaa-rated corporate bonds. *Others* are other firm level predictive variables including the earnings-to-price ratio, the dividend-to-price ratio, and the equity variance. *t*-statistics are in parenthesis. *t*-statistics are computed using heteroskedasticity and auto-correlation consistent standard errors.

Anomaly	Long-leg		Short-leg		Long-Short	
	b_1	b_2	b_1	b_2	b_1	b_2
Size	0.0001	-0.0026	-0.0062	-0.0124	0.0063	0.0098
	(0.06)	(-5.34)	(-6.48)	(-11.93)	(5.66)	(8.34)
Book to Market	0.0004	-0.0051	-0.0043	-0.0053	0.0047	0.0002
	(0.84)	(-11.97)	(-7.75)	(-8.67)	(6.15)	(0.29)
Financial Distress	-0.0030	-0.0139	-0.0029	-0.0048	-0.0001	-0.0091
	(-4.58)	(-19.59)	(-5.36)	(-9.37)	(-0.11)	(-10.75)
Ohlson's O (Distress)	0.0009	-0.0006	-0.0093	-0.0160	0.0102	0.0154
	(5.38)	(-3.22)	(-11.80)	(-20.21)	(12.54)	(18.76)
Net Stock Issues	0.0017	-0.0036	0.0013	-0.0054	0.0004	0.0018
	(9.77)	(-22.09)	(3.19)	(-11.51)	(1.04)	(3.64)
Accrual	0.0003	-0.0015	0.0004	-0.0017	-0.0001	0.0002
	(1.17)	(-5.54)	(1.23)	(-4.94)	(-0.19)	(0.37)
Profitability	0.0024	-0.0020	-0.0089	-0.0205	0.0113	0.0185
	(5.27)	(-4.03)	(-11.32)	(-25.19)	(11.34)	(17.76)
ROA	0.0012	-0.0004	-0.0079	-0.0169	0.0091	0.0165
	(2.99)	(-1.11)	(-10.55)	(-22.90)	(9.71)	(17.59)
Investment-to-assets	0.0004	-0.0053	-0.0037	-0.0090	0.0041	0.0037
	(0.79)	(-9.82)	(-5.76)	(-14.23)	(4.56)	(4.18)
External Financing	-0.0004	-0.0066	-0.0068	-0.0164	0.0065	0.098
	(-0.53)	(-9.18)	(-9.05)	(-19.41)	(5.58)	(8.04)
Asset Turnover	0.0000	-0.0026	-0.0062	-0.0124	0.0062	0.0098
	(0.06)	(-5.34)	(-6.48)	(-11.93)	(5.66)	(8.340
Combination	0.0018	-0.0016	-0.0049	-0.0113	0.0067	0.0098
	(4.98)	(-4.17)	(-7.86)	(-16.83)	(7.57)	(10.17)

Chapter2: Loan Loss Provisions and Bank Stock Returns

2.1 Introduction

Banks are different from non-financial firm in many aspects (for example, O'Hara, 1983; Diamond and Dybvig,1983; Diamond, 1984; Fama, 1985; Gorton and Pennachi, 1990, etc). One prominent distinction is that banks are sensitive to the changes in the probability of disaster states. Recent studies have suggested banks are especially sensitive to the probability of a tail event since banks are exposed to bank-specific risk component.[1] This high sensitivity arises from bank characteristics such as high leverage, explicit government guarantee, regulation, and maturity structure, all of which affect the likelihood of distress.[2]

In particular, given that banks' primary business is to originate loans, the deterioration of loan portfolios during the disaster states has significant effect on the risk exposure of banks, which increases the probability of distress. Therefore, banks have Loan Loss Provisions (LLP) as a capital cushion to protect banks from potential losses on loan portfolios and excessive risk exposures in disaster states. In this paper, I study the effect of LLP on bank stock returns.

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[1] See Adrian, Etula, and Muir (2012), Gandhi and Lustig (2012), Kelly, Lustig, and Niewuwerburgh (2012), Baker and Wurgler (2013) and others.

[2] Recent studies that banks are sensitive to the probability of disaster states since banks are subject to run not only by depositors but also by creditors. (See Duffie, 2010; Gorton and Metrick, 2012; He and Xiong, 2012).

The issue of LLP is particularly important for banks because LLP is an essential accrual item for banks.[3] In principle, the purpose of LLP is to absorb potential future losses on loan portfolios. However, banks might lower LLP because LLP reduce the reported earnings of banks.[4] Given this trade-off, this paper explores the asset pricing implications of an LLP premium in bank stock returns. For example, if a bank has high LLP, the expected return on its stock is lower in equilibrium than that of low-LLP banks -- because LLP absorb some of the bank risk in disaster states.

Even though banks are special and different, many asset pricing studies typically exclude banks as well as other financial firms from their empirical analyses.[5] For example, Fama and French (1993) exclude financial firms because "the high leverage that is normal for these firms probably does not have same meaning as non-financial firms, where high leverage more likely indicates distress." Some studies have examined a factor model for bank stock returns. In an early set of papers, Flannery (1981) and Flannery and James (1984) find that a short-term interest rate factor is positively related to stock returns, whereas Demsetz and Strahan (1997) find two additional risk factors, namely, the term

[3] LLP in bank stocks have the similar role to accruals in non-financial stocks. For studies that examine accruals in non-financial stocks, see, for example, Dechow (1995), Sloan (1996), and Richardson, Sloan, Soliman, and Tuna (2005).
[4] A large literature has established that the use of LLP to smooth reported net income and its relation to bank risk-taking. See, for example, Ahmed, Takeda, and Thomas (1999), Leaven and Majnoni (2003), Laeven and Levine (2009), Beatty and Liao (2011), Bushman and Williams (2012), and Kilic, Lobo, Ranasinghe, and Sivaramakrishnan (2012).
[5] Such papers include Fama and French (1993), Basu (1983), Lakonishok, Shleifer, and Vishny (1994), Berk (1995) and many others.

structure and the default credit spread.[6] More recently, Gandhi and Lustig (2012) find that larger banks have lower risk-adjusted returns, and Baker and Wurgler (2013) find that low-risk (i.e., better capitalized) banks have higher stock returns. Yet none of studies have conducted formal asset-pricing tests to investigate the relation between LLP and bank stock returns.[7]

Accordingly, in addition to this literature, I study Loan Loss Provisions (LLP), which play the role of a capital cushion for banks, and their relationship to bank stock returns. This paper examines four issues: (1) Do the existing factor models for non-financial stocks explain bank stock returns? (2) Is there an LLP premium in bank stock returns? (3) Does our new risk factor model (namely, including the LLP-return factor) better explain bank stock returns? (4) Is the predictability of our new factor model robust?

To answer the questions, I begin our analysis by adjusting the portfolio returns for exposure to the known risk factors that explain cross-sectional variation in average returns. I use Fama and French's (1993) three-factor (market, small minus big, high minus low), the momentum factor, and add two bond risk factors (term, default) to test the relation between risk factors and bank stock returns. I focus on the interpretation of alphas from factor regressions. The magnitude and significance of alphas is the yardstick for the evaluation of the

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[6] Given that these were early papers, it is reasonable that they did not include the value, size and momentum factors, and did not use the latest asset pricing methodology.

[7] Laeven and Levine (2009), Bushman and Williams (2007, 2012), Muñoz, Norden, and Udell (2012), and Peydró, Jiménez, Ongena, and Saurina (2013) suggest that LLP are an important variable for cushioning the bank against adverse events, reduce bank total risk and are generally pro-cyclical. They do not however examine LLP in asset pricing framework.

factor models.[8] If the factor model specifies the risk factors well, then the expected alphas should be equal to zero and insignificant for all portfolios. I find that seven out of ten portfolio alphas are significant when testing the standard factor model for bank stock returns. This result indicates that the existing four-factor model does not explain bank stock returns well. Similar results are found when I augment the model with two interest rate factors, namely, the term structure and default spread factors.

One of the key results in this paper is that LLP are an important risk factor for banks. I find that low-LLP bank stocks have significantly higher risk-adjusted returns than medium- and high-LLP bank stocks, a sort of LLP premium. In addition, I show that the LLP premium remains statistically significant while controlling for the short-term premium, default spread premium, too-big-to-fail premium, and bank capitalization premium. A rare disaster model explains why investors demand higher returns on low-LLP bank stocks.[9] The LLP risk premium compensates investors for holding low-LLP bank stocks during bad times because low-LLP banks are more likely to be distressed in disaster states.

Most importantly, I examine the new factor model including the LLP return factor for bank stock returns. I form the LLP return factor, by taking a long position on low-LLP bank stocks and taking a short position on high-LLP bank stocks. Our results indicate that the LLP return factor adds a new dimension of

[8] Lewellen, Nagel, and Shanken (2010), Chen, Novy-Marx, and Zhang (2011), Gandhi and Lustig (2012) and many others apply the same approach.
[9] Regarding the literature of a disaster framework, see, for example, Rietz (1988), Barro (2006), Gabaix (2008) and Wachter (2013).

explanatory power absent in the existing factor models. The new factor model including the LLP return factor reduces the magnitude of LLP anomaly mostly to insignificance. When I test the new factor model including the LLP return factor, the alphas are close to zero and become statistically insignificant for most of portfolios.

For robustness, I perform additional tests to ensure that the findings are not driven by the issue of the sample selection or mispricing. First, I examine whether the findings are driven by the financial crisis years. To test the impact of financial crisis, I exclude the data for crisis years 2007-2009, and implement the same test for a new sample without the crisis years. These results are consistent with the findings of the full sample, indicating that the financial crisis does not affect the results of our study. In addition, to investigate the possibility of investor mispricing, I use the methodology of Daniel and Titman (1997) and compare the loadings on the mimicking factor and the LLP bank characteristic. Our result does not provide much evidence against the new factor model although the relation between factor loadings and returns is weaker than predicted. In sum, our test results imply that the new factor model for bank stock returns including the LLP return factor is generally robust.

The rest of the paper is organized as follows. I discuss the related prior literature in Section 2. Section 3 describes the data and the LLP return factor. Section 4 provides our empirical results. Section 5 investigate the source of mispricing. Section 6 concludes.

2.2 Related Literature

In this section, I describe the related prior literature. I begin by describing the literature on LLP. A significant literature examines the use of LLP to smooth reported net income and manage bank capital. Such papers include Beatty, Chamberlain, and Magliolo (1995), Collins, Shackelford, and Whalen (1995), Ahmed, Takeda, and Thomas (1999), Leaven and Majnoni (2003), Liu and Ryan (2006) and Kilic, Lobo, Ranasinghe, and Sivaramakrishnan (2012). Other studies have examined the role of LLP in mitigating the pro-cyclical effect of the business cycle on bank risk-taking (see, Laeven and Levine, 2009; Beatty and Liao, 2011; Bushman and Williams, 2012; Muñoz,Norden, and Udell, 2012; and Peydró, Jiménez, Ongena,and Saurina, 2013). Beaver, Eger, Ryan and Woflson (1989), Wahlen (1994), Liu and Ryan (1995), and Liu, Ryan and Wahlen (1997) examine if LLP have a significant effect on the valuation of banks.

However, none of the above studies have conducted formal asset-pricing tests to investigate the relation between LLP and bank stock returns. In this regard, our study is the first to document the LLP premium in bank stocks and provide a new risk factor model for bank stock returns.

Second, some studies have examined factor models in bank stock returns. For example, Demsetz and Strahan (1997) find that banks tend to pursue riskier and more profitable activities. Regarding the determinants of bank risk and return, Flannery and James (1984) find that the interest rate sensitivity is related to stock returns.[10] More recently, Gandhi and Lustig (2012) find that larger banks have lower risk-adjusted returns, and Baker and Wurgler (2013) find that low-risk (i.e., better capitalized) banks have higher stock returns. In this paper, I make sure that the LLP premium remains statistically significant while controlling for the short-term interest factor, default spread premium, too-big-to-fail premium, and bank capitalization premium.

Third, I extend the disaster framework developed by Rietz (1988), Barro (2006), Gabaix (2011), and Wachter (2013) to enhance the economic interpretation of empirical findings. Recently, Gandhi and Lustig (2012) use the notion of tail risk to explain the size anomaly in bank stock returns. Similarly, Gandhi (2011) applies the disaster framework to evaluate the relation between credit supply and bank stock returns. A large literature has provided the evidence of tail risk in banking sector and its relation with financial crisis.[11] For example, Kelly, Lustig, and Nieuwerburgh (2012) find that out-of-money index put options on bank stocks were relatively cheap during the recent crisis, as a consequence of the government absorbing sector-wide tail risk.

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[10] In addition, Stiroh (2006) find that cross-sectional differences in bank risk is positively related to commercial and industrial lending, consumer loans, and reliance on noninterest income. DeYoung and Rice (2004) and Stiroh (2004) find evidence of growing noninterest income and higher volatility associated with banks.

[11] Previously, the significant literature already points out that risk taking incentives among banks cause financial crises. (See, for example, Bernanke, 1983; Diamond, 1984;Fama, 1985; James, 1987; Bernanke and Blinder, 1988; Gorton and Pennachi, 1990;Calomiris and Kahn, 1991;Kashyap, Stein and Wilcox, 1993;Kashyap, Rajan and Stein, 2002)

2.3 Data

We collect data on market capitalization and returns for bank stocks from the Center for Research on Security Prices (CRSP). I obtain the list of commercial banks and bank-level balance sheet data from the Federal Reserve Bank (FRB).[12] Interest rates data including 10-year and 3-month Treasury bills are downloaded from Federal Reserve Economic Data (FRED). By focusing on banks, I do not include insurance companies, investment banks, investment management companies, and brokers. The sample period is 1990-2012. I also test the sample before 2000 since bank regulation (SEC letter SR 99-22) and accounting rules for LLP (SFAS 133) changed in 1999.

As in Gandhi and Lustig (2012), I include two bond risk factors.[13] As our first bond risk factor, *term*, I use the excess returns on an index of 10-year bonds issued by the U.S. treasury. As our second bond risk factor, *default*, I use the excess returns on an index of investment grade corporate bonds. To compute excess returns, I use the three-month Treasury bill rate as the risk-free rate. I use the one-period change in the option adjusted credit spreads for Moody's Baa-rated corporate bonds as the investment grade corporate bond rate.

2.3.1 Constructing the LLP return factor

[12] The FRB Chicago provides bank balance sheet data via Bank Regulatory in Wharton Research Data Services (WRDS).

[13] Various authors have examined the empirical sensitivity of bank stock returns to the changes in market interest rates. (Flannery, 1981; Flannery and James, 1984) However, Giliberto (1985) argues that the relevance of these studies is limited because of a potential misspecification problem due to the use of orthogonalized residual factors.

To get LLP, I use ‘Provision for loan and lease losses’ (BHCK 4230) issued by FRB. I use FRB data in portfolio sorts in the months immediately after the most recent public earnings announcement. For example, if ‘Provision for loan and lease losses’ for the fourth fiscal quarter of year t-1 is publicly announced on March 25 of year t, I use the announced ‘Provision for loan and lease losses’ to form portfolios at the beginning of April of year t. I follow the methodology to construct the LLP return factor that is analogous to that of the creation of SMB and HML return factors. Following Fama and French (1993) and Chen, Novy-Marx, and Zhang (2011), I form the LLP return factor, by taking a long position on low-LLP banks and taking a short position on high-LLP banks.

2.4 Results

2.4.1 Standard factor model

We start by testing the 10 decile-sorted portfolio returns for exposure to the existing risk factors. I regress monthly excess returns for each LLP-sorted portfolio on the Fama-French three factors, momentum factor and two bond risk factors. I calculate the value-weighted returns for each portfolio. Portfolios are rebalanced monthly. For each portfolio, I run OLS regressions to estimate beta coefficients.

We focus on the interpretation of alphas from factor regressions as the yardstick for evaluating factor models. If the factor model specifies the risk factors well, the expected conditional alpha should be equal to zero and insignificant for all portfolios.

Table 1 reports the regression coefficients for each LLP-sorted portfolio, along with their statistical significance and the adjusted R^2. The portfolios are ranked from the lowest (portfolio 1) to the highest (portfolio 10). In Table1, seven out of the ten portfolio alphas are significant. This result indicates that the standard four-factor model does not explain bank stock returns well. This return spread is statistically significant at the 5% level. The average normal-risk-adjusted return on the second highest portfolio less the second lowest portfolios is -157 basis points per month. One interesting explaining of the risk-adjusted return in Panel A is that the factor model does well in low- LLP portfolios. The alphas are insignificant and close to zero in the first, third and fifth LLP-sorted portfolios.

In sum, the findings of Table 1 indicate that the existing factor models do not perform well on bank stock returns. These results are consistent with those of Gandhi and Lustig (2012). I interpret these results that there might be a missing risk factor in bank stock returns.

2.4.2 LLP Premium

In Panel A of Table 2, I present the mean stock returns for LLP-sorted portfolios. The portfolios are ranked from the lowest (portfolio 1) to the highest (portfolio 10). Ten portfolios of banks are formed monthly by assigning banks to deciles based on the value of their LLP. I find that low-LLP bank stocks have significantly higher returns than medium- and high- LLP bank stocks. The mean stock returns in each portfolio decreases with the amount of LLP, from 1.16% for the first portfolio to 0.23% for the tenth portfolio. I interpret this result in a risk-return framework that LLP risk premiums compensate investors for owning low-LLP banks during bad times. Since low-LLP indicates that banks will be more sensitive to their loan losses and will be more likely to be distressed in a tail event, investors demand higher returns if they hold low-LLP bank stocks. If a bank has enough LLP, the expected return on its stock is lower in equilibrium compared to the low-LLP bank. The results of Table 2 indicate LLP are an important factor for bank stocks. I label this return spread between low-LLP and high- LLP bank stocks, as the LLP premium.

In Panel D of Table 2, I examine whether the LLP premium is consistent under the different models of expected returns. To test the effect of LLP, I test the difference of alphas of LLP long-short portfolio under the seven different factor models. Panel D presents the alphas for regressions of excess portfolio returns on a CAPM (market returns only), three-factor (Fama-French), four-factor (Fama-French plus momentum), and four-factor plus the term structure and default spread factors, four-factor plus the TBTF (too-big-to-fail) factor, four-factor plus the capital return factor and four-factor plus both the TBTF and capital factors. For different models I find: alpha is 90 basis points for the CAPM, 90 basis points for the Fama and French (1993) three-factor model, 91 basis points for the four-factor model. Similarly, when the too-big-to-fail premium, the capital return factor, and the term interest rate are included, I find alphas of 96, 87, and 89 basis points, respectively. All abnormal returns (alphas) are statistically significant. These results indicate that the LLP premium remains constant through different models, and is not driven by existing factors. Overall, Panel D provides strong evidence that the LLP premium exists in bank stock returns.

2.4.3 A New Factor Model

In this section, I test a new factor model which includes the LLP return factor. I form the LLP return factor, by taking a long position on low-LLP banks and taking a short position on high-LLP banks.

We regress monthly excess returns for each LLP-sorted portfolio on the four stock factors, two bond factors, and the LLP return factor. In addition, I run the regression for pre-SEC period and post-SEC period -sorted portfolios. Table 3 reports the results based on sorting by LLP. I find that only one out of the ten portfolios has significant alphas. This result suggests that the LLP return factor adds a new dimension of explanatory power absent in the standard factor models. Not only does the magnitude of the alphas change, but most of them are statistically insignificant. The alphas are insignificant and close to zero in most portfolios.

We run the regression for both pre-SEC period and post-SEC period-sorted portfolios. Table 4 reports the results based on sorting by pre-SEC period. Table 4 presents the estimates from OLS regression of monthly returns on each portfolio of bank stocks. In Table 4, only two out of the ten portfolios has significant alphas. This result suggests that the new factor model including the LLP return factor provides a good description for the size anomaly in bank stock returns. Table 5 reports the results post-SEC period sorted portfolios. I find none of portfolio alphas are significant. Not only does the magnitude of the alphas change, but most of them are statistically insignificant. In Table 5, the alphas are insignificant and close to zero in all portfolios. This result indicates that LLP are an important risk factor for bank stock returns.

2.4.4 Robustness Tests

This section provides additional tests to examine the robustness of the LLP premium.

2.4.4.1 Financial crisis

We first examine whether our results are driven by the financial crisis. Table 6 shows the result of regressions, after excluding the data for crisis years 2007-2009. Table 6 reports the regression coefficients for each LLP-sorted portfolio, along with their statistical significance and the adjusted R^2. I find that only two out of the ten portfolios have significant alphas. These findings are consistent with those in Table 3 which does include the financial crisis years.

This result suggests that the financial crisis does not significantly affect our key results.

2.4.4.2 Is It Mispricing?

The above results suggest that LLP are an important risk factor in bank stock returns. However, it is still possible that our results on LLP are driven by investor mispricing. To distinguish between the risk explanation and the mispricing explanation of the LLP premium, I identify variation in LLP factor loadings that is independent of the LLP characteristic, and test whether this independent variation in LLP loadings is associated with the spread in average returns. The risk explanation predicts that LLP loadings will continue to predict the positive return relation after controlling for LLP characteristics. In contrast, the mispricing explanation predicts that LLP loading will have no incremental predictive power after controlling for variation in LLP.

We follow the approach of Daniel and Titman (1997) to isolate the variation in LLP loadings that is unrelated to LLP characteristics. I sort stocks in to portfolios based on LLP, size and LLP loadings and form a set of 27 portfolios. The ex-ante LLP factor loadings are obtained by regressing monthly excess returns of each stock over the last 36 months on those factors. The ex-ante estimates for each of the five factor loadings are then used to further subdivide the nine size- and LLP-sorted portfolios. Panel A of Table 7 presents the mean monthly excess returns of the 45 test portfolios formed with the LLP factor-loading sorts. Each columns provides the monthly excess returns of portfolios of stocks that are ranked in the particular quintile with respect to the LLP factor loading (with column 1 being the lowest and column 3 being the highest). Within each of the nine LLP/size group, the sort on the pre-formation LLP loading produces a return variation while leaving the LLP and size characteristic approximately constant. If risk as measured by ex-ante loadings on the LLP factor explains the LLP anomaly, then mean returns should increase with these loadings.

By looking at the result in Panel A, I find the positive relation between average return and LLP factor loadings. Averaging across the nine LLP/size portfolios, the mean excess return of the lowest LLP loading portfolio is 70 basis points per month, whereas the average for the highest LLP loading portfolio is 91 basis points per month. Overall, the high LLP loading portfolios earn returns that are on average higher than the low LLP loading portfolios, which support the prediction of rational factor pricing.

In Panel B, I report the intercepts and the t-statistics in parenthesis, from the factor regressions applied to each of the 27 test portfolios. If the factor model is correct, then the alphas obtained by regressing the returns on the risk factor portfolios should be zero. B reports the intercepts for the LLP factor model regressions. Rational factor pricing predicts that the intercepts should be zero. In Panel B, 8 of the 27 intercept have t-statistics greater than two in absolute value. The mispricing explanation predicts that if a portfolio with high-LLP-loading fails to obtain a high average return, its intercept with respect to the factor model will be negative. Similarly, the hypothesis implies that the intercept of a low-LLP-loading should be positive. In Panel B, one of the nine high-LLP-loading portfolios shows significant negative intercepts. Also one of the nine low-LLP-loading portfolios shows significantly positive intercepts. Instead, two of the nine low-LLP-loading portfolios produce significant negative intercepts. Overall, the evidence in Panel B is generally not supportive of the mispricing explanation. In summary, the results in Table 7 suggest that the LLP premium can be not be fully explained by investor mispricing.

2.5 A Source of Mispricing

In this section, I investigate the source of mispricing by testing the relation between bank discretionary LLP and bank stock returns. The possible explanation for risk-return relation of LLP premium is that banks have an incentive to reduce LLP to increase earnings, as a result, those banks possibly experience a distress when economic conditions are bad given that LLP works as a capital cushion.

To access whether banks' discretion is related to the amount of LLP, I estimate banks' discretionary accruals. The approach to estimate discretionary LLP is analogous to the common use of the modified Jones model to derive as a discretionary accrual. Similar to Bushman and Williams (2012) and Cohen, Cornett, Marcus, and Tehranian (2012), the residuals of the OLS regression is obtained to generate the absolute discretion.

I begin my analysis to obtain absolute discretion for each LLP -sorted portfolio. Table 8 shows the results of estimated absolute discretionary accruals in banks. In Panel A, the absolute high discretion is relatively larger in low LLP portfolio. This indicates that low LLP banks use their discretion to reduce LLP.

To clarify the role of discretion in bank stock returns, I examine the relation among high discretion, LLP, and mean excess returns. Table 9 presents the average LLP and the mean excess returns according to strong vs. weak banks or high vs. low discretion. Banks are assigned “Strong” and “Weak” groups based on whether they are above or below the median Capital Ratio (Total Equity/Total Assets). The measure of High/Low Discretion is based on whether banks are above or below the median discretionary LLP. In Table 9, I find evidence that high discretion is positively related to higher bank stock returns. These results suggests that banks use their discretion to reduce LLP, as a result, banks with low LLP require higher returns than bank with high LLP.

2.6 A Simple Model

To enhance the economic interpretation of our empirical findings, I present an asset pricing model that produces the LLP premium. Following Rietz (1988) and Barro (2006), I extend their rare disaster model to obtain a risk premium in the states with a low probability of rare events.

We begin by assuming an economy with a risk-averse representative investor, I, and a representative bank, B. This economy has the small possibility of the disaster (a tail event) in each time. Following Mehra and Prescott (1985), this model is related to a version of Lucas' (1978) representative-agent model with exogenous, stochastic production.

$$u(c_t) = e^{-\delta t}\frac{c_t^{1-\gamma}-1}{1-\gamma}$$

δ is the time preference and γ is the coefficient of relative risk aversion. The variable ct is consumption at time t. The total cash flow affects consumption of investors for bank stocks. To compute the expected returns of bank stocks, I model the overall bank cash flows and the process for aggregate consumption. As in Barro (2006), the overall bank cash flows At evolve as a random walk.

$$log(At+1) – log(At) = θB + υB + ηt+1$$

We assume that $\theta_i \approx \omega_i \times \theta_B$ to ensure the evolution of cash flows from the individual loans is consistent with the evolution of the overall cash flow of the bank. ω_i is the fraction of the total bank loan portfolio invested in loan i. The random term, υB, is given by $\upsilon_B \sim N(\mu_{B\,,}\sigma_B^2)$. The mean μ_B is given by the type of loans that the bank has originated. Hence, μ_B is high for banks with good loans, and vice versa. I assume that banks can observe μ_i and the distribution of μ_i is $\mu_i \sim N(0,1)$. This indicates that the distribution of the quality of loans does not change over economic states. This assumption is consistent with the theoretical models of Diamond (1984, 1991), Ramakrishnan and Thakor (1984), Fama (1985), and Boyd and Prescott (1986).

As in Barro (2006), ηt+1 is an economic shock that affects the cash flows of banks. Let p is the probability of no-disaster (p>0), then, ηt+1 is defined as:

Probability e^{p} if no-disaster is realized: ηt+1 = 0

Probability 1 – e^{p} if thedisasterstate is realized: ηt+1 = log(1-k)

In disaster states, a fixed amount, k, of the cash flows from each loan is lost, as a result, some consumption for bank stock investors decrease. However, the loss, k, could be mitigated if banks have enough LLPs when a tail event happens. Accordingly, I derive the stock price of the one-period bank equity claim as follows:14

$$P_t = A_t e^{-\delta-(\gamma-1)\theta+(\gamma-1)\mu_B+\left(\frac{1}{2}\right)(\gamma-1)^2\sigma^2}\left[e^{p_t} + (1-e^{p_t})(1-k)^{1-\gamma}\right]$$

The conditional (disaster) and unconditional (no disaster) expected equity premium of bank stocks are:

Conditional equity premium = $\gamma\sigma_B^2 + p(1-q)[E(1-k)^{\gamma} - E(1-k)^{1-\gamma} - Ek]$

Unconditional equity premium|ηt+1=0 = $\gamma\sigma_B^2 + p(1-q)[E(1-k)^{\gamma} - E(1-k)^{1-\gamma}]$

The above equations indicate that the "Ek" for low-LLP banks are likely to be larger than the "Ek" for high-LLP banks when the disaster state is realized.

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[14] As in Barro (2006), we define the payoff for the government bond in next equations. On default, a fraction *d* of the gross return on the bond is lost. q is the default probability.

Probability e^{p} : R_{t1}^{f}

Probability $(1 - e^{p})(1 - q)$: $R_t^b = R_t^f$

Probability $(1 - e^{p})q$: $R_t^b = (1-d)R_t^f$

Therefore, high-LLP banks earn higher returns than low-LLP banks during bad times, in which consumption is low. This means that low-LLP banks are more likely to experience bigger losses in cash flows- thus more likely to be distressed during the tail event. This implies investors demand higher returns on low-LLP banks, because the covariance between marginal utility of investors and the returns on bank with low LLP is negative.

Interpreting the implication in a risk-return framework, LLP risk premiums compensate investors for owning low-LLP banks during bad times. Given that low-LLP indicates that banks will be more sensitive to loan losses and more likely to be distressed in the case of a tail event, investors demand higher returns if they hold low-LLP bank stocks. Accordingly, if a bank has high LLPs, the expected return on its stock is lower in equilibrium when compared to the expected return of a low-LLP bank.

In summary, the above model suggests that investors holding low-LLP bank stocks are compensated by a LLP premium, because low-LLP banks are more likely to be distressed in a tail event.

2.7 Conclusion

This paper finds the standard factor models do not explain bank stock returns well. I investigate the linkage between Loan Loss Provision (LLP) on a bank’s income statement and bank stock returns. I find that low-LLP bank stocks have significantly higher risk-adjusted returns than medium- and high-LLP bank stocks. These findings indicates that low-LLP banks are more likely distressed when economic conditions are bad, as a results, investors require higher returns on low-LLP bank stocks. Most importantly, the new factor model including the LLP return factor adds a new dimension of explanatory power for bank stock returns, reducing the magnitude of alphas mostly to insignificance. Combined with its economic intuition, this essay suggests that the LLP plays an important role in evaluating bank stock returns.

Table 2.1 Test without LLP factor

This table presents the estimates from OLS regressions of monthly excess returns on each portfolio of banks. The portfolios are rebalanced monthly. *market*, *smb*, and *hml* are the three Fama-French stock factors: the market, small minus big, and high minus low respectively. *umd* is the momentum factor. *term* is the excess return on an 10year t-bond and *default* is the excess return on investment grade corporate bonds(Moody's Baa-Aaa). *LLP* is the difference between the simple average of the returns on the low- LLP and high- LLP each month. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels, respectively. The sample period is 1990-2012. *t*-statistics are based on the heteroskedasticity-consistent standard errors of White (1980).

	Lowest	2	3	4	5	6	7	8	9	Highest
market	0.639***	0.507***	0.552***	0.555***	0.552***	0.603***	0.696***	0.760***	0.849***	0.805***
	(27.29)	(24.10)	(26.00)	(24.80)	(25.69)	(24.92)	(29.19)	(29.47)	(28.25)	(25.85)
smb	0.222***	0.274***	0.344***	0.334***	0.308***	0.356***	0.331***	0.276***	0.421***	0.536***
	(7.86)	(10.73)	(13.34)	(12.31)	(11.82)	(12.11)	(11.42)	(8.80)	(11.48)	(14.03)
hml	0.534***	0.534***	0.578***	0.680***	0.626***	0.686***	0.770***	0.832***	0.948***	0.949***
	(17.01)	(18.90)	(20.29)	(22.68)	(21.68)	(21.11)	(24.11)	(24.01)	(23.47)	(22.40)
umd	-0.0383**	-0.0854***	-0.0757***	-0.0608***	-0.0539***	-0.119***	-0.0685***	-0.104***	-0.160***	-0.190***
	(-2.00)	(-4.95)	(-4.34)	(-3.32)	(-3.06)	(-5.99)	(-3.51)	(-4.91)	(-6.47)	(-7.37)
term	0.00250***	0.00225***	0.00365***	0.00355***	0.00355***	0.00260***	0.00278***	0.00350***	0.00379***	0.000970
	(3.04)	(3.12)	(5.08)	(4.70)	(4.88)	(3.17)	(3.46)	(4.02)	(3.72)	(0.94)
default	0.000552	0.00173	-0.00362	-0.00884***	-0.00688***	-0.00772***	-0.0130***	-0.0107***	-0.0187***	-0.0221***
	(0.22)	(0.77)	(-1.59)	(-3.70)	(-2.99)	(-2.97)	(-5.13)	(-3.89)	(-5.79)	(-6.72)
α	0.00106	-0.0000425	0.00128	0.00661***	0.00564**	0.00737***	0.00963***	0.00562**	0.0111***	0.0145***
	(0.40)	(-0.02)	(0.54)	(2.68)	(2.37)	(2.75)	(3.66)	(1.97)	(3.34)	(4.23)
adj. R-sq	0.117	0.105	0.122	0.118	0.118	0.119	0.143	0.143	0.145	0.106

Table 2.2 LLP premium

Ten portfolios of banks are formed monthly by assigning firms to deciles based on the value of LLP. The LLP is defined as ‘Provision of loan and lease losses’ (BHCK 4230) issued by FRB, and scaled by total asset. Panel E presents the alphas from OLS regressions of monthly excess returns on each portfolio of banks. The portfolios are rebalanced monthly. three-factor indicates *market*, *smb*, and *hml* factors.*market*, *smb*, and *hml* are the three Fama-French stock factors: the market, small minus big, and high minus low respectively. Four-factor includes the momentum factor. *term* is the excess return on an 10year t-bond and *default* is the excess return on investment grade corporate bonds. *TBTF* is the second principal component of factors following Gandhi and Lustig (2012). *Capital* is the factor in Baker and Wurgler (2013) that Low–capitalized minus High–capitalized. Statistical significance is indicated by *, **, and *** at the 5%, 1%, and 0.1% levels, respectively.

	Low	2	3	4	5	6	7	8	9	High
					Panel A: Period (1990-2012)					
Mean excess return	0.0110	0.0098	0.0091	0.0098	0.0103	0.0098	0.0085	0.0080	0.0073	0.0023
					Panel B: Period (1990-1999)					
Mean excess return	0.0119	0.0105	0.0108	0.0127	0.0127	0.0124	0.0125	0.0122	0.0112	0.0081
					Panel C: Period (2000-2012)					
Mean excess return	0.0108	0.0095	0.0081	0.0073	0.0084	0.0079	0.0054	0.0049	0.0045	-0.003

Panel D: Factor Models and Alphas

	CAPM	*3-factor*	*4-factor*	*4-factor + TBTF*	*4-factor + Capital*	*4-factor + TBTF and Capital*
Long	0.0031	0.0031	0.0033	0.0037	0.0031	0.0033
Short	-0.0059	-0.0059	-0.0058	-0.0059	-0.0056	-0.0056
Difference	0.0090***	0.0090***	0.0091***	0.0096***	0.0087***	0.0089***

Table 2.3 Test with LLP factor: Entire sample

This table presents the estimates from OLS regressions of monthly excess returns on each portfolio of banks. The portfolios are rebalanced monthly. *market*, *smb*, and *hml* are the three Fama-French stock factors: the market, small minus big, and high minus low respectively. *umd* is the momentum factor. *term* is the excess return on an 10year t-bond and *default* is the excess return on investment grade corporate bonds(Moody's Baa-Aaa).*LLP* is the difference between the simple average of the returns on the low-LLP and high- LLP each month. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels, respectively. The sample period is 1990-2012. *t*-statistics are based on the heteroskedasticity-consistent standard errors of White (1980).

	Lowest	2	3	4	5	6	7	8	9	Highest
market	0.643***	0.499***	0.528***	0.537***	0.538***	0.572***	0.652***	0.710***	0.785***	0.748***
	(27.15)	(23.47)	(24.70)	(23.80)	(24.84)	(23.52)	(27.38)	(27.58)	(26.16)	(23.96)
smb	0.234***	0.278***	0.344***	0.338***	0.315***	0.349***	0.317***	0.262***	0.398***	0.506***
	(8.31)	(10.93)	(13.43)	(12.53)	(12.15)	(11.99)	(11.11)	(8.48)	(11.04)	(13.40)
hml	0.543***	0.517***	0.525***	0.640***	0.596***	0.614***	0.670***	0.716***	0.799***	0.805***
	(16.81)	(17.79)	(17.97)	(20.79)	(20.10)	(18.47)	(20.60)	(20.35)	(19.47)	(18.62)
umd	-0.0345*	-0.0663***	-0.0298*	-0.0213	-0.0203	-0.0607***	0.0104	-0.0140	-0.0491*	-0.0874***
	(-1.74)	(-3.71)	(-1.65)	(-1.13)	(-1.11)	(-2.96)	(0.52)	(-0.65)	(-1.94)	(-3.28)
term	0.000881	0.000694	0.000636	0.00193***	0.00194***	0.00186***	0.00236***	0.00240***	0.000546	0.00246***
	(1.30)	(1.16)	(1.06)	(3.04)	(3.18)	(2.71)	(3.53)	(3.32)	(0.65)	(2.89)
default	0.00472*	0.00580**	0.00262	-0.000542	0.00121	0.000233	-0.00318	0.000174	-0.0101***	-0.0134***
	(1.75)	(2.40)	(1.07)	(-0.21)	(0.49)	(0.08)	(-1.18)	(0.06)	(-2.95)	(-3.83)
LLP	0.00891	0.0757***	0.185***	0.160***	0.135***	0.239***	0.320***	0.371***	0.449***	0.410***
	(0.41)	(3.90)	(9.42)	(7.72)	(6.79)	(10.70)	(14.65)	(15.75)	(16.33)	(14.42)
α	-0.00325	-0.00354	-0.00144	-0.00496	-0.00586	-0.00505	-0.00676	-0.0107*	0.00726	-0.00437
	(-0.61)	(-0.75)	(-0.30)	(-0.99)	(-1.22)	(-0.93)	(-1.28)	(-1.87)	(1.09)	(-0.65)
adj. R-sq	0.112	0.112	0.143	0.132	0.125	0.131	0.172	0.167	0.162	0.110

Table 2.4 Pre-SEC Period (1990-1999)

This table presents the estimates from OLS regressions of monthly excess returns on each portfolio of banks. The portfolios are rebalanced monthly. *market*, *smb*, and *hml* are the three Fama-French stock factors: the market, small minus big, and high minus low respectively. *umd* is the momentum factor. *term* is the excess return on an 10year t-bond and *default* is the excess return on investment grade corporate bonds(Moody's Baa-Aaa).*LLP* is the difference between the simple average of the returns on the low-LLP and high- LLP each month. Statistical significance is indicated by *, **, and *** at the 10%, 5%, and 1% levels, respectively. *t*-statistics are based on the heteroskedasticity-consistent standard errors of White (1980).

	Lowest	2	3	4	5	6	7	8	9	Highest
market	0.871***	0.707***	0.680***	0.742***	0.769***	0.809***	0.847***	0.946***	0.994***	1.114***
	(23.70)	(20.45)	(19.86)	(19.69)	(21.42)	(21.79)	(22.53)	(24.59)	(22.70)	(18.35)
smb	0.284***	0.291***	0.309***	0.391***	0.328***	0.303***	0.369***	0.237***	0.405***	0.599***
	(6.50)	(7.09)	(7.60)	(8.74)	(7.69)	(6.89)	(8.25)	(5.19)	(7.79)	(8.32)
hml	0.775***	0.709***	0.614***	0.854***	0.803***	0.740***	0.811***	0.892***	0.967***	1.275***
	(13.58)	(13.23)	(11.57)	(14.55)	(14.45)	(12.85)	(13.86)	(14.96)	(14.26)	(13.52)
umd	-0.0747*	-0.0659*	-0.0924**	-0.0583	-0.0421	-0.102**	-0.108***	-0.0710*	-0.0867*	-0.120*
	(-1.87)	(-1.76)	(-2.49)	(-1.42)	(-1.08)	(-2.54)	(-2.63)	(-1.70)	(-1.82)	(-1.82)
term	0.00171	0.0000088 3	0.00215*	0.00173	0.00364***	0.00347***	0.00219	0.00187	0.000779	- 0.000219
	(1.30)	(0.01)	(1.76)	(1.28)	(2.85)	(2.63)	(1.63)	(1.36)	(0.50)	(-0.10)
default	-0.0108	-0.0209***	-0.0228***	-0.00980	-0.00556	-0.0162**	0.00314	0.000741	-0.0119	-0.0177
	(-1.38)	(-2.82)	(-3.11)	(-1.21)	(-0.72)	(-2.05)	(0.39)	(0.09)	(-1.27)	(-1.36)
LLP	-0.111***	-0.0360	-0.0178	0.0358	0.0120	0.0895**	0.176***	0.184***	0.443***	0.696***
	(-3.14)	(-1.09)	(-0.54)	(0.99)	(0.35)	(2.52)	(4.87)	(4.99)	(10.57)	(11.96)
α	0.00148	0.0205***	0.00865	0.00296	-0.0134	-0.00457	-0.0108	-0.00886	0.00653	0.0140
	(0.18)	(2.60)	(1.11)	(0.34)	(-1.64)	(-0.54)	(-1.26)	(-1.01)	(0.65)	(1.01)
adj. R-sq	0.130	0.114	0.109	0.117	0.124	0.133	0.154	0.165	0.187	0.166

Table 2.5 Post- SEC Period (2000-2012)

This table presents the estimates from OLS regressions of monthly excess returns on each portfolio of banks. The portfolios are rebalanced monthly. *market*, *smb*, and *hml* are the three Fama-French stock factors: the market, small minus big, and high minus low respectively. *umd* is the momentum factor. *term* is the excess return on an 10year t-bond and *default* is the excess return on investment grade corporate bonds. *LLP* is the difference between the simple average of the returns on the low- LLP and high- LLP each month. Statistical significance is indicated by *, **, and *** at the 5%, 1%, and 0.1% levels, respectively. *t*-statistics are based on the heteroskedasticity-consistent standard errors of White (1980).

	Lowest	2	3	4	5	6	7	8	9	Highest
market	0.553***	0.403***	0.464***	0.456***	0.426***	0.445***	0.584***	0.610***	0.663***	0.596***
	(16.67)	(13.61)	(15.34)	(14.86)	(14.27)	(12.73)	(17.45)	(16.28)	(14.92)	(13.41)
smb	0.234***	0.326***	0.390***	0.351***	0.356***	0.417***	0.300***	0.293***	0.465***	0.542***
	(5.97)	(9.26)	(10.85)	(9.65)	(10.04)	(10.02)	(7.56)	(6.58)	(8.79)	(10.24)
hml	0.470***	0.492***	0.513***	0.588***	0.565***	0.614***	0.627***	0.666***	0.799***	0.768***
	(11.10)	(13.03)	(13.30)	(15.05)	(14.80)	(13.77)	(14.74)	(13.94)	(14.08)	(13.38)
umd	-0.0464	-0.0929***	-0.0249	-0.0234	-0.0438	-0.0905***	0.0258	-0.0155	-0.0883*	-0.139***
	(-1.81)	(-4.06)	(-1.06)	(-0.98)	(-1.89)	(-3.33)	(1.00)	(-0.53)	(-2.56)	(-4.00)
term	0.00199	0.00151	-0.00117	0.000568	-0.000606	0.000144	0.00137	0.00161	-0.00188	0.00152
	(1.38)	(1.19)	(-0.90)	(0.43)	(-0.47)	(0.10)	(0.95)	(1.00)	(-0.98)	(0.81)
default	0.00530	0.00968**	0.00411	-0.000122	-0.00180	-0.00117	-0.00525	-0.00163	-0.0132**	-0.0135**
	(1.59)	(3.27)	(1.35)	(-0.04)	(-0.60)	(-0.33)	(-1.57)	(-0.44)	(-2.96)	(-3.09)
LLP	0.0490	0.101***	0.249***	0.195***	0.164***	0.264***	0.370***	0.434***	0.437***	0.337***
	(1.75)	(4.08)	(9.75)	(7.51)	(6.48)	(8.94)	(13.13)	(13.78)	(11.66)	(9.11)
α	-0.00778	-0.0120	0.00370	-0.000270	0.00780	0.00307	0.000136	-0.00527	0.0199	-0.00159
	(-0.92)	(-1.61)	(0.48)	(-0.03)	(1.04)	(0.35)	(0.02)	(-0.56)	(1.78)	(-0.15)
adj. R-sq	0.112	0.112	0.143	0.132	0.125	0.131	0.172	0.167	0.162	0.110

Table 2.6 Risk-adjusted return on LLP-sorted portfolio of banks without crisis years

This table presents the estimates from OLS regressions of monthly excess returns on each portfolio of banks. The portfolios are rebalanced monthly. *market*, *smb*, and *hml* are the three Fama-French stock factors: the market, small minus big, and high minus low respectively. *umd* is the momentum factor. *term* is the excess return on an 10year t-bond and *default* is the excess return on investment grade corporate bonds. *LLP* is the difference between the simple average of the returns on the low- LLP and high- LLP each month. Statistical significance is indicated by *, **, and *** at the 5%, 1%, and 0.1% levels, respectively. *t*-statistics are based on the heteroskedasticity-consistent standard errors of White (1980).

	Lowest	2	3	4	5	6	7	8	9	Highest
market	0.405***	0.265***	0.395***	0.306***	0.291***	0.323***	0.436***	0.410***	0.455***	0.521***
	(11.07)	(8.61)	(12.41)	(9.36)	(9.40)	(8.66)	(13.14)	(10.42)	(9.92)	(12.01)
smb	0.380***	0.414***	0.482***	0.502***	0.498***	0.454***	0.446***	0.448***	0.538***	0.701***
	(9.24)	(12.08)	(13.57)	(13.79)	(14.46)	(10.91)	(12.05)	(10.22)	(10.53)	(14.37)
hml	0.414***	0.389***	0.424***	0.474***	0.388***	0.510***	0.511***	0.526***	0.578***	0.676***
	(8.35)	(9.56)	(10.06)	(10.96)	(9.51)	(10.34)	(11.64)	(10.10)	(9.53)	(11.66)
umd	-0.100***	-0.0942***	-0.0133	-0.0225	-0.0341	-0.0820**	0.00212	-0.0422	-0.0624	-0.0937**
	(-3.63)	(-4.16)	(-0.56)	(-0.93)	(-1.49)	(-2.98)	(0.09)	(-1.44)	(-1.84)	(-2.88)
LLP	-0.0006	0.045	0.189***	0.144***	0.106**	0.199***	0.317***	0.425***	0.492***	0.431***
	(-0.02)	(1.34)	(5.46)	(4.06)	(3.16)	(4.92)	(8.81)	(10.01)	(9.89)	(9.23)
term	0.0058	-0.0064*	-0.0012	0.0029	0.0003	0.0028	0.0101***	0.0074*	0.0049	0.0102**
	(1.80)	(-2.40)	(-0.43)	(1.03)	(0.10)	(0.87)	(3.50)	(2.20)	(1.24)	(2.78)
default	-0.0030	0.0074***	0.0036	-0.0002	0.0007	-0.0002	-0.0069**	-0.0031	-0.0016	-0.0093***
	(-1.25)	(3.62)	(1.72)	(-0.12)	(0.35)	(-0.09)	(-3.14)	(-1.22)	(-0.54)	(-3.33)
α	0.0049	-0.0156**	-0.0122*	-0.0025	0.0008	-0.0023	0.0104	0.0011	-0.0021	0.0117
	(0.82)	(-3.07)	(-2.37)	(-0.48)	(0.16)	(-0.39)	(1.95)	(0.17)	(-0.28)	(1.76)
adj. R-sq	0.071	0.088	0.115	0.091	0.090	0.082	0.121	0.115	0.110	0.106

Table 2.7 Mean excess monthly returns of the portfolios formed on the basis of provision, size, and LLP factor loadings

This table presents the mean monthly returns for 27 portfolios formed based on loan loss provision characteristics, and pre-formation LLP factor loadings. The factor loadings are obtained by regressing the monthly excess returns of each portfolio over the last 36 months on those factors.

		Panel A: Mean Excess Monthly returns by LLP Factor Loading		
Char. Port.		Factor Loading Portfolios: Mean Excess Return		
LLP	Size	1	2	3
1	1	0.00788	0.013052	0.00807
1	2	0.010078	0.011591	0.007069
1	3	0.009438	0.009653	0.011061
2	1	0.010236	0.006671	0.012028
2	2	0.007811	0.012146	0.010416
2	3	0.00976	0.00889	0.009982
3	1	-0.00117	0.003112	0.008707
3	2	0.004738	0.000931	0.005673
3	3	0.004803	0.004756	0.009517
Average		0.007063	0.007867	0.009169
		Panel B: Portfolio alphas by LLP Factor Loading		
Char. Port.		Factor Loading portfolio		
LLP	Size	1	2	3
1	1	0.00958 (1.15)	0.00515 (0.60)	0.0193 (1.72)
1	2	-0.00195 (-0.28)	-0.0158 (-2.26)	-0.00434 (-0.56)
1	3	-0.0287 (-3.84)	-0.0323 (-3.67)	-0.0218 (-1.83)
2	1	0.000205 (0.02)	0.0169 (2.22)	-0.00063 (-0.06)
2	2	-0.00609 (-0.85)	-0.00373 (-0.58)	0.00546 (0.81)
2	3	-0.0365 (-4.81)	-0.0191 (-3.16)	-0.0133 (-1.77)
3	1	0.0164 (1.00)	0.0147 (0.85)	0.0193 (1.01)
3	2	0.0305 (2.60)	-0.00888 (-0.72)	-0.00578 (-0.51)
3	3	-0.0165 (-1.39)	-0.0174 (-1.98)	-0.0381 (-4.03)
Average		-0.003672778	-0.006717778	-0.004431667

Table 2.8 Discretionary LLP and Absolute Discretionary LLP

This table presents the average discretionary LLP according to ten portfolios. Ten portfolios of banks are formed monthly by assigning banks to deciles based on the value of LLP. The LLP is defined as 'Provision of loan and lease losses' (BHCK 4230) issued by FRB, and scaled by total asset. The approach to estimate discretionary LLP is analogous to the common use of the modified Jones model to derive as a discretionary accrual. Similar to Bushman and Williams (2012) and Cohen, Cornett, Marcus, and Tehranian (2012), the residuals of the OLS regression ($LLP_{it} = a_{it} + b1_{it}$ *earning before LLP* + $b2_{it}$*logAssets* +$b3_{it}$ *Capital Ratio* + $b4_{it}$ *change of GDP* + e_{it}) is obtained to generate the absolute discretion (Abs(e_{it}×($Loans_{it}/Assets_{it}$))).

	Low	2	3	4	5	6	7	8	9	High
Panel A: Absolute Mean Discretionary LLP										
	0.00130	0.00108	0.00103	0.00099	0.00098	0.00104	0.00114	0.00134	0.00187	0.00394
Panel B: Mean Return										
	0.01409	0.01260	0.01287	0.01498	0.01442	0.01217	0.01342	0.01177	0.00837	0.00009

Table 2.9 LLP and Mean excess returns: Strong vs. Weak, High vs. Low discretion in the entire period

This table presents the average LLP and the mean excess returns according to strong vs. weak banks or high vs. low discretion. Banks are assigned “Strong” and “Weak” groups based on whether they are above or below the median Capital Ratio (*Total Equity/Total Assets*). The measure of High/Low Discretion is based on whether banks are above or below the median discretionary LLP. The approach is analogous to the common use of the modified Jones model to derive as a discretionary accrual. Similar to Bushman and Williams (2012) and Cohen, Cornett, Marcus, and Tehranian (2012), the residuals of the OLS regression ($LLP_{it} = a_{it} + b1_{it}$ *earning before LLP* $+ b2_{it}$*logAssets* $+b3_{it}$ *Capital Ratio* $+ b4_{it}$ *change of GDP* $+ e_{it}$) is obtained to generate the absolutediscretion (Abs(e_{it}×($Loans_{it}$/$Assets_{it}$))). *t*-statistics are parentheses.

Panel A:LLP and Mean excess returns: Strong vs. Weak, High vs. Low discretion

	Strong	Weak	Strong-Weak	High Discretion	Low Discretion	High-Low
LLP	0.0021	0.0030	-0.0009 (-32.35)	0.0035	0.0017	0.0018 (58.74)
Mean excess return	0.0078	0.0088	-0.0010 (-1.55)	0.0105	0.0062	0.0043 (6.53)

Panel B: Mean excess return based on double-sort

	Strong	Weak	Strong-Weak
High Discretion	0.0107	0.0103	0.0004 (0.30)
Low Discretion	0.0054	0.0070	-0.0016 (-1.89)
High - Low	0.0053 (6.53)	0.0033 (3.11)	

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