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# HIGHER ORDER MOMENTS RESAMPLING

Giuseppe Galloppo, Università di Roma Tor Vergata

## ABSTRACT

*This paper develops a set of portfolio optimization models that involve a resampling approach of the higher order moments of financial assets return distributions. Specifically, the first four moments are examined. The Resampled Efficiency (RE) techniques introduce Monte Carlo methods to properly represent investment information uncertainty in computing minimum variance (MV) portfolio optimality. Notwithstanding the central limit theorem, for both the academic and financial communities it is a well known fact that stock market returns exhibit latent higher moment risk in the form of negative skewness and high kurtosis. Taking cue from these considerations we have added higher-order moments to the resampling rule. We discuss the solution of the higher order moments resampling approach by replaying an investment game. The game compares the performance of a player using four portfolio schemes for determining portfolio weights using a Monte Carlo based resampling approach. Extensive computational results are obtained on a real-world dataset with two different resampling approaches. Surprisingly, when higher moments of stock return distributions are accounted for in the resampling optimisation algorithm success is mixed.*

**JEL:** G11

**KEYWORDS:** higher-order moments, resampled efficiency (RE), Monte Carlo, MV portfolio optimality

## INTRODUCTION

Optimal asset allocation has generated considerable interest in finance since the seminal papers by Merton (1969) and Samuelson (1969) but important caveats remain. One of these caveats is estimation error in parameters. Empirical evidence indicates that asset returns are partially predictable. Three methods are currently available to address estimation errors. One deals with changing the objective function to explicitly include estimation risk. One form of this approach is often called “robust” optimization and aims at explicitly incorporating estimation error into the portfolio optimisation process (Tăutăuncău and Käoenig, 2004, Ceria and Stubbs, 2005). According to Tăutăuncău and Käoenig (2004) robust optimization consists of finding solutions to optimization problems with uncertain input parameters. Uncertainty is described using an uncertainty set which includes all, or most, possible realizations of the uncertain input parameters. On this issue Sherer (2006) show that the optimality of robust optimisation critically depends on the complicated interplay between risk aversion and uncertainty aversion.

An alternate is Bayesian methods which have a very strong rooting in decision theory. This approach involves rescaling the input parameters to certainty equivalent values. This latter approach consist of using of quadrature methods (Ang and Bekaert (2001), Lynch (2001)) or resampling methods based on Monte Carlo simulations (Barberis (2000)) to find a range of optimal portfolios. The user picks the one preferred according to a certain objective function. Quadrature methods may not be very precise when the underlying asset return distributions are not Gaussian, as is strongly suggested by empirical research, (see Bollerslev et al., 1992 and Gallant and Tauchen, 1989). While Monte Carlo methods do not suffer from this problem, they can be computationally expensive to use as they rely on discretization of the state space and use grid methods. Besides with regard to other approaches, resampling methods have additional benefits related to trading costs. In this article we focus on the resampling approach. Resampling is based on a stochastic simulation procedure where resampled returns and standard deviations are derived stochastically using the original historical optimiser inputs (New Frontier Advisors, 2001).

# OPTIMAL INVESTMENT FOR INSTITUTIONAL INVESTORS UNDER VALUE-AT-RISK CONSTRAINTS IN CHINESE STOCK MARKETS

ZhengXiong Chen, Hillsdale Investment Inc.  
Ayse Yuce, Ryerson University

## ABSTRACT

*Value at Risk (VaR) is defined as the worst expected loss under normal market conditions over a specific time interval at a given confidence level. Given the widespread usage of VaR, it becomes increasingly important to study the effects of the portfolio optimization subject to the VaR constraint set by the fund manager. In this paper, we examine the classical portfolio optimization models and the most popular VaR methodologies. We show that the portfolio optimization models under VaR constraint provide the clear insight to the mean-variance decision. We also consider the problem with the extra tracking error constraint. Furthermore, we provide an empirical analysis on the model by using China's market data. VaR estimates are produced via Monte Carlo simulations.*

**JEL:** G11; G15; G32

**Keywords:** Portfolio optimization, mean-variance, VaR, Monte Carlo

## INTRODUCTION

Many investment fund managers choose Mean-Variance analysis and Value at Risk (VaR) as their most important supporting tools in their asset allocation and portfolio allocation decision-making. Nowadays, the fund managers turn to focus on the downside possibility of portfolio and the new benchmark for the measure of risk is Value at Risk.

After VaR was introduced by Philippe Jorion (2001), some researchers also discuss the relationship between Mean-Variance analysis and VaR. However, most of their analyses are in terms of absolute return of portfolio, without taking the benchmark into account. In this paper, we try to highlight the similarities and differences between Mean-Variance analysis and Value at Risk and find out how institutional investors, who care about the relative performance of their portfolio to the benchmark, do their risk-return management under Value at Risk constraint using returns relative to the benchmarks.

We will further investigate to solve the institutional investor's utility maximization problem subject to VaR constraint. In other words, we introduce VaR restriction into the problem of Knight (2005) and extend its research. Furthermore, we use the data from Chinese market to examine and support our conclusion. As a young emerging market, China's stock market has experienced extraordinary growth since the inceptions of the Shanghai and Shenzhen Stock Exchange in late 1990s. On its way to go to the matured market, it has a lot of specialties which make our findings more interesting.

The paper is organized as follows. We present the previous studies in Section II. In Section III, we derive the solution for the constrained maximum problem in mathematical framework. In Section IV we further explain the reason why we choose Chinese capital market as our research objectives and illustrate the characteristics of the data. Section V The conclusions are made in Section VI.

## LITERATURE REVIEW

VaR was first introduced and popularized in 1994 by J.P. Morgan's famous RiskMetrics software. The subsequent research works, such as Pichler and Selitch (1999), Jorion (2001) and Alexander (2003) provide a complete analysis of VaR methodology and successfully help VaR become a standard concept in risk

# A SIMULATION OF THE U.S. ECONOMY TO DETERMINE THE EFFECT OF MANDATORY EXPENSES AND INTEREST ON THE U.S. DEBT

Gerard D. Valle, Stevens Institute of Technology

## ABSTRACT

*Cost for the three major mandatory social programs; Social Security, Medicare and Medicaid have increased at a rate much higher than the Gross Domestic Product (GDP), and thus revenue. As a result, these programs account for a larger portion of the U.S. budget. As projections continue to rise relative to available revenue, a lower level of funds will be available for other programs or the U.S. debt will continue to increase further exacerbating the problem. As the total U.S. debt approaches the yearly GDP (in 2010 the total U.S. debt is projected to be 97% of the GDP), the risk of rising interest rates becomes a larger concern. This paper shows that even a small increase in the interest rate has a big impact on the overall budget. This paper shows that the practice of continuing to increase the U.S. debt at a rate higher than the GDP/revenue increases is simply unsustainable.*

**JEL:** H51, H55, H68

**KEYWORDS:** Projections, Interest on U.S. Debt, Social Security, Medicare, Medicaid

## INTRODUCTION

Over the last several decades mandatory spending, primarily Social Security, Medicare and Medicaid have been consuming a larger portion of Federal spending. In 1966, Social Security, Medicare and Medicaid accounted for 16% of Federal spending. In 1986 and 2006, these same programs accounted for 30% and 40% of Federal spending, respectively. With 80 million baby boomers hitting retirement age beginning in 2008, projections indicate that these mandatory programs will see even bigger demands.

This paper looks at Social Security in detail and displays surplus/deficit projections under intermediate and high assumptions as reported in the 2009 Social Security Trustees Report. Social Security is projected to begin running a deficit in 2016, under intermediate assumptions, but with unemployment at 10% and an increased number of claims; Social Security will most likely see a deficit much sooner. In Walker's *Comeback America*, Social Security expects to have a negative cash flow in 2010/2011. This paper also looks at the effect increasing revenue and/or decreasing cost has on the long-term Social Security surplus/deficit projections.

As described in Friedman, Medicare spending has grown by 2.4% points faster than GDP over the past thirty years more than tripling as a share of GDP since 1960. If costs continue to grow at current rates relative to GDP, then Medicare alone will account for 8% of the GDP and 44% of the revenue in 2030. According to the Congressional Budget Office, rising health cost is the biggest contributor to cost growth contributing even more than that due to the ageing population. In this paper, the author calculates budget surplus/deficit projections for Medicare Health Insurance (HI). Medicare Hospital Insurance (HI) currently operates in a deficit and that deficit projects to grow with each passing year.

The deficit is the gap between expenditures and revenue in any given year (\$1.4 trillion in the U.S. in 2009), whereas debt accumulates past deficits (total, public plus private, U.S. debt at the end of 2009 is \$12.4 trillion). As described in Chernew, Baicker and Hsu, having such a large total debt relative to the

# USING FINANCIAL RATIOS AND LENDER RELATIONSHIP THEORY TO ASSESS FARM CREDITWORTHINESS

Alan Reichert, Cleveland State University  
Raymond Posey, Mount Union College

## ABSTRACT

*This study examines the determinants of farm loan delinquencies, and in particular, the influence of multiple loans and multiple lenders on delinquency. The number of lenders used by a borrower, the number of loans outstanding, and the interaction of the two factors are all positively related to loan delinquency rates. In fact, these factors are at least as significant as standard financial ratios in explaining farm loan delinquency. The most consistent finding is that borrowers who have been denied credit in the past five years are more likely to be delinquent. Furthermore, borrowers using multiple lenders appear to be able to bargain for lower interest rates.*

**JEL:** G2; M1; M4

**KEYWORDS:** Credit scoring, lending relationships, farm credit

## INTRODUCTION

The current financial crisis in general and the problems associated with CTI, a major small businesses lender, demonstrates the importance of a prosperous small business sector in terms of supporting economic growth and employment. Small businesses in the US are responsible for approximately half the economic activity and more than 50% of the job growth. At the same time, small business generally do not have the same direct access to the money markets that larger firms have and hence are more reliant on their local bank for funding. Using a unique data set this paper focuses on a frequently neglected small business sector, namely small farms. While agricultural commodity prices rose dramatically from 2003-2007, the financial crises ultimately caught up to this sector in the guise of falling land and crop prices and increasingly tight credit conditions. The focus of this paper is to examine the factors that influence the creditworthiness of small farm borrowers. While small farms are similar in many respects to other small businesses, the farm owner-operator often resides on the farm and the distinction between personal and corporate assets may blur. For example, farmland may serve as collateral for loans to both the farm operation and to secure a mortgage on the residence. Alternatively, the residence and other personal assets may serve as collateral for farm operating loans. Thus, researchers often make a distinction between the farm-household and the farm-firm.

## LITERATURE

A few authors have examined the determinants of bank loans to agricultural firms. Zech and Pederson (2003) found that the debt-to-asset ratio is a strong predictor of the farm borrower's ability to repay the loan. They further found that asset turnover and family living expenses are good predictors of farm performance. Durguner and Katchova (2007) find that the prior year's working capital to gross farm return, debt-to-asset ratio, and return on farm assets are the most pertinent factors explaining creditworthiness. In earlier work, Splett, Barry, Dixon, and Ellinger (1994) developed a five-factor credit-scoring model. The five factors measure liquidity (current ratio), solvency (equity-asset ratio), profitability (ROE), repayment capacity (capital debt-repayment margin), and efficiency (net income from operations ratio). Weights are applied to each factor to arrive at an overall credit score. Some

# DO FUNDAMENTALLY-ADJUSTED VALUATION MULTIPLES IMPROVE VALUATION ACCURACY? THE CASE OF THE POLISH STOCK MARKET

Jacek Welc, Wrocław University of Economics

## ABSTRACT

*A series of popular stock investment strategies are based on buying stocks with low valuation multiples. These strategies assume that low multiples signal undervaluation. However, the low multiples can be justified by fundamentals. In such cases even stocks with very low multiples can be overvalued. In this paper regression analysis is used to identify the impact of fundamentals on multiples. The multiples are the dependent variable and the accounting ratios are the explanatory variables. Such a regression enables the estimation of the fundamentally-adjusted multiple. The regression residuals measure the scope of undervaluation / overvaluation. Using this approach, the most undervalued (overvalued) stocks are those with the most negative (positive) residuals (and not the stocks with the lowest actual multiples). We compared the profitability of strategies based on low actual multiples with the profitability of strategies based on actual and fundamentally-adjusted multiples. Data from the Polish stock market from 1998-2010 are examined. The research found that allowing for the impact of accounting fundamentals on multiples can increase the accuracy of valuation in the case of P/S multiple but not in the case of P/E and P/BV multiples.*

**JEL:** G11, C21

**KEYWORDS:** corporate valuation, relative valuation, investment strategies, valuation multiples

## INTRODUCTION

The efficient market theory argues that “the market takes into account all information that is relevant to the valuation of assets when setting the price (such as earnings estimates, management team skill, industry conditions, estimated demand, etc.), and thus it is nothing but a big waste of time and money to try to outsmart the market” (Jones, 2008). However, this theory is in sharp contrast with abundant research indicating that using simple stock market investment strategies such as buying stocks with low values of valuation multiples can in the medium- and long-run generate returns significantly exceeding returns of the market as a whole as well as returns of more sophisticated (allowing for much more data) strategies (Fama, French, 1998).

These investment approaches assume that low valuation multiples signal a relative undervaluation. However, in many cases, the low values of multiples are justified by fundamental factors. In such cases even stocks with very low valuation multiples can be considerably overvalued (Damodaran, 2004; Goedhart, Koller, Wessels, 2005). The tool that enables at least partial allowance for the impact of the fundamentals on multiples is linear regression in which the actual multiples of individual stocks constitute the dependent variable and the selected historical or forecasted accounting ratios are the explanatory variables. The residuals of the regression measure the scope of relative undervaluation / overvaluation of the individual stocks. In this approach, the most undervalued (overvalued) are the stocks with the most negative (positive) regression residuals (and not the stocks with the lowest actual valuation multiples).

In the paper we compared the profitability of investment strategies based on actual valuation multiples with the profitability of the strategies based on comparison of the actual and fundamentally-adjusted valuation multiples on the Polish stock market in 1998-2010 years. The analysis embraced price-to-net-

# DO CHANGES IN PENSION PLAN ACCOUNTING STANDARDS RESULT IN BETTER MARKET VALUATION?

Karen C. Castro-González, University of Puerto Rico

## ABSTRACT

*This study investigates if changes in U.S. accounting standards result in a better assessment of firms' pension commitments as reflected in stock prices. Fama and French three factor (1993) model results reveal that the market inefficiently incorporates defined benefit pension plan information for the three accounting standard related periods. In contrast to Franzoni and Marin (2006), and Fama and French (1993), the returns were estimated starting the fourth month after the end of fiscal year  $t$ . The results suggest that investors are not paying enough attention to the implications of the underfunding for future earnings and cash flows. Apparently, the changes in accounting standards do not alter the way investors evaluate this type of obligation. Hedge-portfolio tests are performed to verify if there is an opportunity to outperform the market by identifying weaknesses in the incorporation of information. Tests' results corroborate that the market overprices firms that have severely negative funding status.*

**JEL:** G14; G23; M48

**KEYWORDS:** Pension plans, accounting standards, information content

## INTRODUCTION

Pension plan systems have been growing fast after the post World War II period. As a result, pension plan obligations have become a major concern for management, regulators, and the government. Through the years, the Financial Accounting Standards Board (FASB) has demonstrated preoccupation with respect to pension plan information disclosures, as demonstrated by the changes in disclosure requirements in the last decades. Efforts to enhance the relevance and understandability of reported pension information also include the enactment of ERISA (Employee Retirement Income System Act of 1974) and the "Pension Protection Act of 2006", the issuance of Statement of Financial Accounting Standards (SFAS) No. 36, SFAS No. 87, SFAS No.132, and most recently, the SFAS No. 158. SFAS No. 158, effective for fiscal years ending after December 15, 2008, provides new pension disclosure requirements intended to address previous shortcomings. Before the issuance of SFAS No. 158, pension plan information concerning the pension plan status was reported in the notes to the financial statements. One of the most important changes of this statement is the presentation of pension plan status in the balance sheet.

A severely underfunded pension plan has future implications in cash flows and earnings. As a result, it is important for investors to assess the pension plan status before making investment decisions. By moving this information from the notes to the financial statements to the balance sheet, the intention of the FASB is to improve and create awareness of the importance of pension plan status information. Evidence from various studies suggests that the information content of selected items included in the financial statements is relevant or has impact on stock prices. Studies about pension plan information suggest different results as to markets evaluation or incorporation of this information. This study examines the incorporation of defined benefit (DB) pension plan information for three different accounting standard related periods between 1980 and 2005. For these accounting standard related periods pension information was presented in the notes to the financial statements.

# THE SENSITIVITY OF COMMON HORIZONTAL EQUITY MEASURES TO VARIATIONS IN OMITTED INCOME

Susan Rhame, University of Dallas  
Robert Walsh, University of Dallas

## ABSTRACT

*This paper examines the sensitivity of horizontal equity measures (coefficient of variation (CV) and coefficient of residual variation (CRV)) to a common assumption in horizontal equity studies – that changes in level of omitted income do not change horizontal equity experienced by taxpayers in similarly situated income groups. It has been assumed in many prior studies that certain income exclusions or deductions allowed from taxable income have no effect on the resulting horizontal equity measurements. This paper examines whether the CV and CRV remain low within each income group when the mortgage interest deduction and the charitable contribution deduction are disallowed. In general, the omission of certain income does create a wider variation of effective tax rates within income groups. The results of this study indicate that future horizontal equity studies should consider that omitted income, either through income exclusions or deductions allowed, may affect horizontal equity measures. In addition, for policy makers, taking steps to decrease the tax gap also increases horizontal equity.*

**JEL:** M41

**KEYWORDS:** taxation, horizontal equity, coefficient of variation, coefficient of residual variation

## INTRODUCTION

Horizontal equity refers to the idea that taxpayers with the same economic income should have the same tax burden (Musgrave 1959). The “tax gap” refers to the differences between what the US government should be collecting from its taxpayers versus actual collections. The tax gap is reportedly over \$300 billion per year (IRS 2005). This gap hurts the economy in two ways. First, to make up for the difference, the tax rates must increase, or debt must increase (along with interest rates). Second, the public perception that, in a self-reporting tax system, that some taxpayers are “getting away with cheating” lessens the ability of the government to collect from everyone. As this paper shows, the “tax gap” also effects horizontal equity – which is another important point of public perception of the tax fairness and hence tax collectability. Prior to this study, tax equity studies often made the assumption that the amount of omitted income has no substantive effect on the outcome of horizontal equity measures calculated. This study examines whether varying levels of income through disallowance of the deductions for home mortgage interest and charitable contribution affects the horizontal equity measures. The purpose of this study is to provide guidance to future tax equity researchers in understanding the capabilities as well as the limitations of currently existing horizontal equity measures. It also points out that decreases in the tax gap will strength horizontal equity. This paper is outlined as follows. Section two describes some of the motivation for the study and provides a literature review. Section three introduces the research design and the hypotheses. Section four presents the results and section five concludes.

## LITERATURE REVIEW

The study of equity and tax distribution is one of the broad paradigms which comprise the accounting literature in taxation. Studies in this paradigm compare the relative tax burdens borne by individual



# FINANCIAL ACCOUNTING REGULATION AND EXECUTIVE COMPENSATION DESIGN

Wei Zhou, Renmin University of China

Hui Zhou, University of Illinois at Urbana-Champaign

## ABSTRACT

*We examine the economic consequences of the recent adoption of SFAS 123(R) in the United States. Consistent with the conjectures of prior research, our results show that the removal of favorable accounting treatment for stock options post SFAS 123(R) results in a switch from stock options to restricted stock. Further analysis shows that this shift is more prominent for high-volatility firms than for low-volatility firms and for low-growth firms than for high-growth firms, a pattern consistent with the implications of the agency theory. This study extends the literature on the economic consequences of financial reporting standards by providing evidence that the leveling of accounting treatment for different forms of equity compensation causes the design of executive compensation to converge to the economically optimal form. By empirically examining the actual consequences of a heavily debated accounting standard change, this study also provides important policy implications that can be helpful in the consideration of future regulatory accounting changes in the United States as well in other accounting jurisdictions.*

**JEL:** J33, M41, M43, M44, M52

**KEYWORDS:** Executive compensation, financial reporting, SFAS 123(R)

## INTRODUCTION

This study investigates the economic consequences of the recent change in the financial reporting standard for employee stock options in the United States. Specifically, we empirically test whether the removal of favorable accounting treatment for stock options post SFAS 123(R) induces firms to alter the relative weight of restricted stock and stock options. Using this accounting regulatory change as a quasi experiment setting, we examine whether the leveling of accounting treatment for different forms of equity compensation causes the design of executive compensation to converge to the economically optimal form as prescribed by the agency theory.

Previous studies on executive compensation have cited favorable accounting treatment of stock options as an important explanation for the deviation of executive compensation from the predictions of the principal agent model. For example, Hall and Liebman (1998) cite accounting rules as an explanation for the virtual non-existence of relative pay (e.g. indexed stock options). Hall and Murphy (2003) suggest that discriminatory accounting treatments may suppress the use of restricted stock in favor of stock options although restricted stock provides economically more efficient incentive instruments under certain circumstances. They argue that the accounting treatment of stock options leads to low perceived cost and thus contributes to the widespread adoption of stock options and hefty pay packages. Consistent with this hypothesis, Carter et al. (2007) find a positive association between financial reporting concerns and the use of stock options and a negative association between financial reporting concerns and the use of restricted stock during the period of 1995 to 2001. Carter et al. (2007) corroborate these findings by examining a sample of firms that began voluntarily expensing stock options in 2002 or 2003, with the conclusion that these firms increased their use of restricted stock and decreased their use of stock options following the voluntary expensing decision. However, the voluntary nature of the expensing decision makes it difficult to draw direct inferences regarding the role of accounting in compensation design due to the existence of self-selection bias.

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