Dissertations Abstracts, Rutgers Business School, 2003-2009

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This compilation is intended to inform potential applicants and others about the variety of doctoral research being conducted in the school. It includes abstracts for all dissertations since September 1, 2003, and abstracts for proposed dissertations that have not been completed.

In the future, the graduate school's rule limiting abstracts to 350 words will be strictly enforced.

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DEPARTMENT OF ACCOUNTING, BUSINESS ETHICS, & INFORMATION SYSTEMS

Accounting

1. Ann F. Medinets, December 15, 2003

Determinants of school effectiveness and students' satisfaction in colleges and universities

Colleges and universities are complex organizations in which multiple stakeholder groups have divergent, sometimes conflicting goals. Although each school must make decisions about the best way to allocate its resources in order to fulfill its mission and satisfy its constituencies, some schools are more successful than others at meeting their constituents' needs. This paper investigates the relationships of outcome proxies for school effectiveness and student satisfaction with candidate predictor variables relating to the characteristics and choices of schools and their students. Data for this study come from the popular press and college guides because this information may shape the expectations of students, potential employers, graduate schools, and benefactors. Four years of data on sixty-four variables for over 200 nationally ranked colleges and universities were collected. This study uses regression, factor analysis, and factor regressions to investigate hypothesized relationships between the candidate predictor variables and the outcome proxies for school effectiveness and student satisfaction within each tier and across tiers.

The results of this study indicate that the variables and factors most strongly associated with school effectiveness and student satisfaction differ significantly from one tier to another, and that short-term satisfaction, long-term satisfaction, and school effectiveness each relate to different variables and factors. Furthermore, this study finds that, although school reputation has considerable ability to predict student satisfaction across all tiers, it explains only a small amount of the variability in student satisfaction in top tier schools and has no explanatory power in the other tiers. For schools that are less successful in achieving effectiveness and student satisfaction, this study may help to identify specific areas that would benefit from detailed analyses and plans for improvement to narrow the gap between the levels of effectiveness and student satisfaction at high-scoring schools and low-scoring schools. The balanced scorecard is suggested as a tool that would help schools to identify the needs of their diverse constituencies and to establish strategic goals to meet those needs.

2. Rong Yang, March 26, 2004

Effect of the SEC's Regulation Fair Disclosure on analyst forecast attributes and related market reactions

On October 23, 2000, the U.S. Securities and Exchange Commission (SEC) issued Regulation Fair Disclosure (hereafter Reg. FD), which prohibits selective disclosure of material nonpublic information to certain financial analysts, institutional investors and others prior to making it available to the general public. This study examines the effect of Reg. FD on analyst forecast performance and market reactions for both closed-call firms and open-call firms as compared to the non-conference-call firms in the pre-Reg. FD and the post-Reg. FD periods. It investigates whether Reg. FD influenced analyst earnings forecast errors and forecast dispersion for the previous closed-call firms in the post-Reg. FD period as compared to the previous open-call firms since some analysts lost their exclusive access to the management after the implementation of Reg. FD. More importantly, it investigates whether the price changes around earnings announcements for both previous closed-call firms and previous open-call firms were the same as intended by the SEC. Since previous studies found conference calls improve analyst forecast performance and increase the information gap between the analysts privy to the call and the remainder of investors before Reg. FD took effect (Bowen, Davis and Matsumoto 2002), this study further analyzes analyst forecast attributes and market reactions between the open-call firms and the closed-call firms after the release of Reg. FD.

The study provides evidence that analysts made more accurate forecasts for closed-call firms as compared to the non-conference-call firms in both pre- and post-Reg. FD periods. Moreover, analysts made more accurate forecast for open-call firms as compared to closed-call firms in the pre-Reg. FD period, whereas there is no significant difference between analyst forecast performance for the previous open-call and the previous closed-call firms in the post-Reg. FD period. Meanwhile, market reactions around earnings announcement dates in three different windows, (-1, +1), (-2, +4) and (-5, +10), are significantly different between the open-call firms and the closed-call firms prior to the release of Reg. FD, whereas these differences disappear after the implementation of Reg. FD. In addition, the first and second Reg. FD events are the most significant events during those six events leading to the passage of Reg. FD.

Overall, these findings imply that, to some extent, Reg. FD did level the playing field for financial analysts and investors, consistent with Reg. FD's success in eliminating selective disclosure.

3. Ahmed M. Ebrahim, September 15, 2004

The effectiveness of corporate governance, institutional ownership, and audit quality as monitoring devices of earnings management

This study examines the effectiveness of different monitoring devices derived from some corporate governance factors, institutional ownership, and the quality of the audit process with their relation to earnings management behavior. Assuming that earnings management is an opportunistic behavior by managers that is not in the shareholders' interest in the long run, the study expects that those corporate governance variables that improve the alignment of interests between managers and shareholders will be related to lower levels of earnings management as measured by the magnitude of discretionary accruals. Therefore, I hypothesize that the magnitude of discretionary accruals will be negatively related to the percent of independent directors on the board, the independence of the audit committee, and the ownership of independent directors in the firm's stock. If a CEO who also holds the board chairman position (CEO duality) and has long tenure may have above-average power over the board as suggested in the organization management literature, I expect the magnitude of discretionary accruals to be positively related to the CEO

duality and long CEO tenure situations. Based on previous arguments and findings in finance and organizations management literature that small boards are more efficient in exercising their entitled monitoring role, I expect earnings management to increase with the board size. In addition to the above corporate governance factors, the study also tests the effectiveness of institutional ownership in the firm and the quality of the audit process as additional monitoring devices with their relation to earnings management behavior, and expects that the magnitude of earnings management will decrease with the level of institutional ownership in the firm and the quality of the audit process.

Using a sample of manufacturing companies during the years 1999 and 2000, the study applies different models suggested in the accounting literature to isolate discretionary accruals. The results support the expectations regarding the effect of the independent directors on the board, independence of the audit committee, institutional ownership, and the effect of the audit quality. The results are, however, inconsistent with the expectations that earnings management will increase with the CEO tenure and board size. The results show that the magnitude of discretionary accruals is negatively related to both of the CEO tenure and board size. The results also do not show any systematic relation between earnings management and the CEO duality. Tests of some interactions between the corporate governance variables indicate that the independence of the audit committee may be a function of the board size. The negative relation between earnings management and audit committee independence variable was significant only for big board observations (board size above the median). However, these interaction tests show no signs of interaction between the CEO duality and both of the CEO tenure or the board independence. The observed negative relation between earnings management and both of CEO tenure and board independence variables holds for both the CEO duality and non-duality observations. Interaction tests also indicate that the monitoring function of independent directors on the board is more effective when board independence is combined with higher institutional ownership, better audit quality, and bigger board size. Additional tests also examined the industry effect and the effect of loss avoidance incentive. The results of these tests show that the different monitoring devices examined in the study are less effective in the situations when managing earnings upward can reverse negative earnings to be slightly above zero. Tests on different industry segments show that the effect of these monitoring devices is generally similar in different industries.

This study contributes to the earnings management literature by examining different models suggested in the literature for isolating discretionary accruals including those models that control for the previous performance such as the portfolio adjusted models. The study also contributes to the current debate about the effectiveness of different corporate governance structures by examining new corporate governance factors with their relation to earnings management, both in individual basis and the possible interaction between them. In addition, the study tests the effect of institutional ownership variable on earnings management.

4. Beixin Lin, September 22, 2004
The value relevance of restructuring charges

This study is the first research that thoroughly examines the value relevance of restructuring charges, i.e. whether restructuring charge is relevant to investors in valuing a firm's equity. Our study finds that although the value relevance of restructuring charge is affected by profitability, as Khurana and Lippincott (2000) suggested, their conclusion that investors view restructuring charge of loss firms as value enhancing is not conclusive. Indeed, only those restructurings that are performance enhancing are priced positively. If a restructuring does not lead to improved operating performance, the associated charge is priced negatively regardless whether it is a profit or loss-making firm. We further find evidence that growth opportunities affect the value relevance of restructuring charge as well. Restructuring charges of high-growth firms have higher pricing multiples, i.e. are associated with greater market value, than those of non-growth firms, probably because high-growth firms have greater advantages to exploit the emerging opportunities than non-growth firms in the event of restructuring. In addition, we find that when a profit firm reports restructuring charges routinely, the value relevance of the charge is impaired, whereas the repetitive restructuring charges have negative implication for a firm with poor earnings. We also find evidence, albeit preliminary, that subsequent restructuring charges are usually recorded in a less timely manner than initial restructuring charges. Finally, we present evidence that Emerging Issues Task Force (*EITF*) *94-3* improves the timeliness of reporting restructuring charges.

The release of *EITF 94-3* consensus presents us an opportunity to examine the value relevance of individual components of restructuring charges. Our empirical findings suggest that the components of restructuring charges provide value relevant information to financial statement users. The coefficients on

the restructuring charge components significantly differ from one another. Further, the results show that workforce reduction has positive effect on market value of equity for both the profit and loss firms. On the other hand, asset write-downs are negatively associated with market value of equity for the profit firms, whereas in the case of loss-making firms, inventory write-downs and lease termination costs are found to have negative value effects.

5. Elaine Henry, March 25, 2005

Are investors influenced by how earnings press releases are written?

Accounting researchers have studied extensively the influence on investors of numerical information in firms' financial disclosure. In this dissertation, I examine the influence of the non-numerical information-- the tone and other stylistic attributes of press releases that accompany announcements of earnings. I use elementary computer-based content analysis to measure the tone and other stylistic aspects of press releases. Tone is measured simply as the number of positive or negative words, scaled by total words. Other stylistic aspects include the overall length of the press release, the overall percentage of numbers versus words, and the complexity of the words used.

To validate the measure of tone, I use a classroom experiment in which fictitious press releases containing different verbal descriptions accompany the same financial data. This experiment confirms that readers are influenced by the tone of earnings press releases and shows the relationship between tone and readers' judgments.

Having confirmed that the tone of press releases can influence the judgment of advanced as well as beginning students, I have turned to studying its influence on investors, using actual earnings press releases and archival capital markets data. I have used two techniques: a standard event study and a predictive data mining algorithm. Both techniques produce evidence suggesting that tone and other stylistic attributes influence investors' decisions.

6. Fatima Alali, September 14, 2005

Earnings management and capital ratio management by different types of banks before and after SFAS No. 114

Accounting, finance and banking researchers have studied extensively earnings management and capital ratio management by commercial banks. This dissertation has three main objectives. First, it examines the differences in the banks managers' behavior with respect to loan loss provisions by different types of banks. Second, it examines whether the level of capitalization, i.e. well/adequately capitalized and undercapitalized banks, will have an impact on managerial behavior of loan loss provisions determination. Third, it examines whether SFAS No. 114 has modified managerial loan loss provisions behavior. I define bank types on three dimensions. First, I define banks by nature on the basis of total assets as defined by regulatory agencies; i.e. money center, regional and community banks. Second, I define banks by riskiness of banks asset portfolio based on regulatory specified risk weighted assets under the Basel Accord of 1988. Third, I define banks by liquidity of assets portfolio. Using a sample of U.S. commercial banks, I document evidence of earnings management and capital ratio management using loan loss provisions. I also show that the earnings management and capital ratio management using loan loss provisions differ with different types of banks.

In specific, I document evidence that money center banks, regional banks, risky banks use loan loss provisions to manage the reported earnings. I find evidence that liquid banks do not use loan loss provisions to manage capital ratios but there is limited evidence that these banks use loan loss provisions to manage the reported earnings. In addition, there is evidence that SFAS No. 114 has diminished managerial behavior with regard to earnings management and capital ratio management for some types of banks and that SFAS No. 114 has provided a closer link between level of loan loss provisions and the loan loss default variables. The findings documented in this dissertation can have regulatory implications and valuation significance.

7. David Gregory DeBoskey, August 18, 2006

Corporate transparency: Key factors and their impact on US firms

This study examines corporate transparency at the firm level in the US market for a sample of 319 S&P 500 firms. Common factor analysis of ten related variables is used to identify key factors of corporate transparency, and their impact on various outcome variables is then evaluated in a series of regression

analyses. The study adapts and extends the conceptual framework for corporate transparency from Bushman, Piotroski, & Smiths cross-country study, finding four readily interpretable factors: disclosure information, earnings quality information (together capturing the extent and quality of public disclosures), intermediary information (capturing what is revealed by others), and insider information (capturing additional information demanded by powerful stockholders). These factors are then used as explanatory variables, along with a set of control variables supported by the literature, in order to evaluate their impact on a number of firm-specific outcome variables: credit rating, cost of debt, cost of equity, weighted cost of capital, beta, market liquidity, and analyst forecast properties.

The use of factor analysis aids in the interpretability and tractability of corporate transparency; the subsequent analyses demonstrate that the four corporate transparency dimensions collectively add significant incremental explanatory power to the risk factors previously documented in the literature for explaining cross-sectional variation in the various outcome variables. This study also examines the specific effects of the individual corporate transparency dimensions on the outcome variables and shows that: (i) credit rating, cost of debt capital, weighted average cost of capital, beta and market depth and forecast dispersion are significantly associated with *disclosure information* corporate transparency; (ii) credit rating, cost of equity capital, weighted average cost of capital, beta, market depth, forecast dispersion and forecast accuracy are significantly associated with *intermediary information* corporate transparency; (iii) relative bid-ask spreads are significantly associated with *earnings quality information* corporate transparency; and (iv) cost of equity and beta are significantly associated with *insider information* corporate transparency. The results of this study offer additional insights into the value of corporate transparency measured more widely than by financial statement disclosures alone. Generally, the results support the notion that corporate transparency has direct implications for both firms and markets.

8. Liz Washington Arnold, September 21, 2006

A qualitative comparative study of the Jenkins Committee recommendations, SOX, and the Enhanced Business Reporting Consortium (EBRC) proposed framework in relation to corporate malfeasance

This study examines the recommendations for business reporting from the AICPA Special Committee on Financial Reporting (the Jenkins Committee)[1] from a historical perspective and provides a historical overview of business reporting drivers. It includes a comparative analysis of the recommendations of the Jenkins Committee (AICPA 1994) to the 2002 Sarbanes-Oxley (SOX) legislation and the October 2005 business reporting framework proposed by the Enhanced Business Reporting Consortium. The Jenkins recommendations and SOX requirements both include, in addition to other items, more disclosure, more board independence and less related party transactions between board members, officers and the corporation. This research seeks to examine the historical value of these recommendation/requirements and their impact on corporate malfeasance.

In addition, this research project explored the types of accounting malfeasance and the financial and market dollar impact ($140 and $857 billion respectively) of 100 companies with publicly announced malfeasance to determine if there was a link between the accounting malfeasance and the Jenkins Committee Recommendations. The results of the exploratory study also supported previous studies which found that revenue was the most common area of corporate malfeasance and actual theft was the least misstated area. The exploratory study was followed with an empirical examination of malfeasance using internal and external monitoring characteristics by matching the malfeasance companies with non-malfeasance companies. The results of the empirical study did not find any significant differences in the monitoring characteristics of malfeasance as compared to non-malfeasance companies.

The research contributes to the body of contemporary accounting literature by providing a historical perspective on business reporting drivers in the current environment, a measurement of the accounting dollar impact, and related market impact for malfeasance companies. In addition, this systematic investigation provides results indicating that the difference tested, in corporate governance characteristics between malfeasance and non-malfeasance companies may not be as significant as deemed in previous studies due to the changing board of director and committee requirements by the SEC and other bodies.

[1] The AICPA Special Committee on Financial Reporting was referred to as the Jenkins Committee as it was chaired by Edmund L. Jenkins, then a partner in Arthur Andersen. The Committee was established in 1991 and after in-depth study and analysis it issued its final report in1994.

9. Wei Xu, December 14, 2006

Value relevance of asset write-offs/write-downs and effectiveness of FASB pronouncements (SFAS #121, #142, #144)

This study, from the long-term association study perspective, aims to examine whether the reported asset write-off/write-down (WO/WD)[1] information is value relevant and whether SFAS #121, SFAS #142 and SFAS #144, collectively, are effective in improving the information value of both the reported long-lived asset write-offs/write-downs and the aggregate accounting numbers, as claimed by FASB. Due to the unobservable value of goodwill, the great management discretion over goodwill impairment charges and the negative criticism, the value relevance (timeliness) of the reported goodwill impairment charges and the specific effect of SFAS #142 on goodwill impairment charges are separately investigated. To better understand the market valuation process and provide standard setters with more insights about the details in asset write-off/write-down activities, a set of the asset write-off/write-down observations are grouped into categories according to the type of assets involved or the underlying reasons for write-off/write-down activities; the information value for each of these sub-categories are further studied.

The empirical results suggest that (1) on average, the reported asset write-off/write-down is value relevant information for pricing of securities, yet consistent with prior studies, we find they are not reported in a timely fashion; (2) the overall explanatory power of the major accounting information (book value and earnings) reported by WO/WD firms is of no difference from that of the non-WO/WD firms after controlling for the negative earnings; (3) SFAS #121 did not help to improve the value relevance or timeliness of the reported financial information, suggesting the extreme negative criticism towards this statement were valid; (4) SFAS #142 and SFAS #144 have made the reported asset impairment charges more aligned with book value of equity and thus share prices; but no significant changes in the reporting timeliness are found in the post-144(142) time period as compared to the post-121-pre-144(142) time period; (5) SFAS #142 and SFAS #144 have improved the alignment between the book value of equity reported by WO/WD firms and the firms market value and a stronger returns-earnings change association is also observed at the mean time; (6) prior to the issuance of SFAS #142, goodwill impairment charges are not value relevant; after the adoption of SFAS #142, such charges are significantly negatively associated with market value, indicating improvement in the information value; (7) the information value of the reported asset write-offs/write-downs differ with respect to different types of assets involved (WO/WD reasons): the empirical findings suggest that market interprets write-off/write-down of significant current assets, PPE, and deferred charges (pure impairment & disc-related impairment in case of WO/WD reasons) as negative signals for the firms value (with different magnitudes); but the coefficients attached to non-GW intangible write-downs and R&D in process write-offs (restructuring-related & M&A related in case of reasons) are not significantly different from zero.

The empirical findings from this study will contribute the asset write-off/write-down accounting research in three major aspects: First, the findings supplement current literature with empirical evidence from the association study perspective. In particular, this study shows asset write-offs/write-downs is value-relevant information for pricing securities on average, which helps to reject the pure earnings management hypothesis. This issue is also addressed with scrutiny by examining different categories of asset write-offs/write-downs separately after controlling for the possible noises. Second, this study thoroughly examined the effects of three consecutively announced FASB pronouncements: SFAS #121, #142 and #144 in response to the negative criticism and mixed research findings. Empirical findings from this area of research will provide valuable feedbacks to the concurrent accounting guidance thus give authoritative agencies more insights towards the usefulness of the standards they promulgated. Finally, this study is a comprehensive examination of all types of asset write-offs/write-downs by using a long and recent sample period (1992-2004) as compared to the other studies, which provides me with a unique opportunity to investigate changes to the asset write-off/write-down practices in the past 15 years. These empirical findings will contribute to the study of the security evaluation process.

10. Paul Lynch, October 2, 2007

An empirical examination of the association between auditor change events and stock prices

The association between auditor change events and stock prices is investigated based on a new sequential partitioning event study research design developed in this dissertation. This research design sequentially partitions auditor change events to control for: i) the differential information content in the Form 8-K filings (single Form 8-K filing and dual Form 8-K filing); ii) the type of auditor change

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(resignations, decline to stand for re-elections and dismissals); and iii) the size differential between the outgoing and incoming auditors [small auditor replaced by small auditor, small auditor replaced by big auditor, big auditor replaced by small auditor and big auditor replaced by big auditor . The event study methodology is used to quantify the market reaction to auditor changes.

Contrary to prior auditor change event studies, total auditor changes at t_1 are consistently negatively associated with stock prices and statistically significant. Partitioning total auditor changes at t_1 by the structure of the auditor change indicates that dual file auditor changes at t_1 are consistently negatively associated with stock prices and strongly statistically significant. Single file auditor changes at t_1 are inconsistently associated with stock prices and are not statistically significant.

Further partitioning of total dual file auditor changes at t_1 by the structure of the auditor change indicates that dual file resignations at t_1 are consistently negatively associated with stock prices and strongly statistically significant. Both dual file decline to stand for re-elections at t_1 and dual file dismissals at t_1 are consistently negatively associated with stock prices but are not statistically significant.

Dual file auditor changes at t_2 are inconsistently associated with stock prices but not statistically significant. Further partitioning of total dual file auditor changes at t_2 by the structure of the auditor change indicates that dual file resignations at t_2 are inconsistently associated with stock prices and statistically insignificant; dual file decline to stand for re-elections at t_2 are consistently negatively associated with stock prices but statistically insignificant; and dual file dismissals at t_2 are consistently positively associated with stock prices but statistically insignificant.

Event study results are robust with respect to alternative specification of the underlying return generating process.

11. Marietta Peytcheva, April 14, 2008

Accountability, reputation costs, and opportunistic auditor behavior

In two related studies, this dissertation examines experimentally the effect of situational pressures in auditing on opportunistic behavior by individual auditors. It is argued that specific conditions present in audit practice increase perceived personal reputation costs and provide auditors with incentives to take actions that may jeopardize the effectiveness of the acquisition and the evaluation of audit evidence. Study 1 examines whether responsibility for previous work and time pressure give rise to reputation concerns and lead auditors to suppress evidence that disconfirms decisions made on the basis of earlier audit work. In a between-subjects experiment, auditors assess the extent of reputation concerns associated with encountering disconfirming evidence late in the audit, and the likelihood that such evidence will be suppressed.

Results indicate that responsibility for earlier audit work and the presence of time pressure induce reputation concerns when auditors encounter disconfirming evidence late in the audit. Responsibility for previous work increases the likelihood for suppression of audit evidence. Although differences exist among firm offices, results hold for the full sample even after controlling for these differences.

Study 2 examines whether knowledge of the views of audit partners leads auditors to misrepresent their judgment and report conclusions that are aligned with partners' views. While previous research has shown that the views of audit partners influence auditor judgment, it has not conclusively determined whether the influence is caused by psychological biases or by strategic economic behavior.

In two between-subjects experiments, auditors and auditing students make judgments under conditions of accountability. Both auditors and students act in a strategic manner to conform to the views of audit partners: participants who have made an audit judgment, and subsequently learn of the conflicting views of audit partners, change their reported judgment so that it conforms to partners' views.

Participants who learn partners' views before they make their own judgment are also influenced by partners' conclusions; moreover, the magnitude of this influence is not significantly different from the magnitude of misrepresentation observed if participants learn partners' views after they have made their own judgment. No significant differences are observed between the judgments of auditors and students.

12. Timothy G. Coville, September 26, 2008

SOX generated changes in board composition; have they mattered?

This dissertation provides a unique contribution to two significant and topical streams of research. First it contributes to the vast amount of work done on the influence(s), if any, of a board of directors' composition, in particular the presence of independent directors. Additionally it contributes to current

research into the effects, if any, of the Sarbanes-Oxley Act of 2002 (SOX herein after) and associated stock exchange regulations on publicly listed firms. The primary methodological tool used is the difference-in-differences methodology, more commonly used by economists to examine the effects attributable to new laws.

This analysis advances the study of effects associated with the use of independent directors, as it employs the difference-in-differences methodology to overcome the endogeneity concerns which have plagued this stream of literature. I accomplish this through timely examination of the effects associated with the exogenously forced addition of independent directors to the boards of publicly listed firms in the wake of SOX and associated stock exchange listing requirement changes. While the opportunities for discovery are rich, given the sweeping nature of SOX and related stock exchange regulations, this dissertations primary aim was to investigate possible effects in five potential areas of board influence: CEO Compensation; Dividend Policy; Discouraging Earnings Management: Spending for Auditor Services; and Approval of capital allocations to optimize risk-adjusted returns.

The study further advances our understanding of the effects of SOX and associated stock exchange listing requirement changes as it uses this same difference-in-differences methodology by segregating firms which had pre-adopted regulations in SOX away from firms that only adopted the regulations once compelled by law. Much of extant SOX impact literature investigates how wide populations of firms changed between pre-SOX and post-Sox periods, without segregating out firms which had pre-adopted as best practices, governance practices later codified by SOX and the major Stock Exchanges. Through this method this dissertation has provided empirical evidence of effects attributable to SOX and related stock exchange regulations not muted by a failure to segregate out these early adopters. I find that firms that were compelled to increase their use of independent directors: 1) increased their CEOs total compensation by increasing the equity plus other components of their compensation packages. While some may feel disappointed with this finding, it is consistent with independent directors increasing the performance-linked elements of their CEOs compensation during a period of rising stock markets and profit growth; 2) increased their dividend ratios and dividend yields. These findings suggest additional research into whether these increases were due to growth in cash dividends or declines in profits and stock prices; 3) showed no clear evidence of affecting earnings management; 4) increased their spending for audit services; and 5) decreased their risk-adjusted returns performance.

13. Ari Yezegel, March 11, 2009

Three essays on stock recommendations

The advent of the internet technology contributed to the rise of discount brokerage houses which allowed mass number of investors to actively manage their investments at low costs. The increasing number of self-managing investors fueled a bursting demand for financial analysis and stock recommendations. In particular, the small unsophisticated investor who traditionally relied on his personal broker for stock recommendations began to seek investment advice from other sources and save the high commissions. In response, financial analysts who were once stuck in banks' back offices suddenly became stars who influenced numerous individual investors' decisions. Given the increasing importance of stock recommendations, this dissertation focuses on the following three issues centered on stock recommendations.

The first essay of my dissertation empirically assesses the value of stock recommendations made by columnists in three leading business magazines; Business Week, Forbes, and Fortune, for the period 2000-2003. I find that the anomalous returns documented in prior studies on columnists are sample specific and are not representative of columnist recommendations in general. I also investigate whether columnists' timing, content and style affect the market reaction to recommendations. The empirical results suggest that recommendations that contain references to management or provide merger & acquisition related rumor trigger significantly greater market reactions. Finally, the long-term performance analysis of columnist recommendations suggests that investors following columnists' advice during the 2000-2003 period would not have consistently earned abnormal returns controlling for market risk, book-to-market, size, and momentum effects.

The second essay examines the relation between the value of analysts' stock recommendations and firms' research and development expenditures. Univariate, calendar-time portfolio and cross-sectional analyses controlling for risk, business complexity, earnings value-relevance, analyst coverage, institutional ownership and bid-ask spread suggest the value of analysts' recommendations to be significantly more valuable for firms that are more intensely engaged in R&D investments. These results are consistent with

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financial analysts providing more informative recommendations for R&D intensive firms and playing a greater role in the asset price discovery process of R&D intensive firms' shares.

In the final essay I examine Regulation FD's impact on corporate practice of earnings-related selective disclosure to financial analysts. A comparative analysis of the association between analysts' recommendation revisions and subsequent earnings surprises, in the pre- and post- Regulation FD periods reveals a significant decline in analysts' earnings-related private information in the post-Regulation FD period. Further, the difference in mean market reaction of analysts' recommendation revisions made during the pre-earnings-announcement period relative to other periods is significantly lower in the post-Regulation FD period. Finally, I find that a trading strategy designed to exploit analysts' earnings-related private information does not accrue significant returns in the post-Regulation FD period despite having significantly outperformed the market during the pre-Regulation FD period. Overall, my findings are consistent with Regulation FD having reduced selective earnings-related disclosure to financial analysts.

Proposal: Dorothy Alexander-Smith, January 25, 2008
The analyst's influence on earnings quality

This study investigates (1) whether analysts use the firm's quality of earnings as a determinant of the amount of private information they produce for the firms which they follow; and (2) whether analysts private information production functions as a form of scrutiny on managers, capable of influencing them to improve the quality of reported earnings.

The study's first focus is on the role of earnings quality in the analysts private information production activities. Prior literature provides evidence that analysts have incentives both to incorporate high quality information into their forecasts (Lang and Lundholm [1996]; Stickel [1992]) and to maximize trading commissions (Hayes [1998]). Hypothesis 1 posits that analysts seek to produce more private information when the quality of the firms reported earnings is low. Low quality earnings provide investors with a poor signal of firm value and therefore analysts private information becomes even more valuable generating belief revision and hence more trading and higher commission income for analysts.

The second focus of the study is on whether analysts private information production efforts function as a form of scrutiny on managers, with higher levels of scrutiny being capable of influencing improvements in the quality of reported earnings. While prior literature finds that disclosure quality drives analyst following (Lang and Lundholm, 1996; Healy et al., 1999), I investigate whether there is also a simultaneous effect, where the level of analysts' scrutiny can also impact managers reporting quality.

Earnings quality, EQ, is assumed to be directly related to the accuracy and reliability of accruals. Accruals provide information on the amounts, timing and riskiness of *cash flows*- a primary measure used by investors and analysts to value firms. A modified version (Francis et. al. 2005) of the Dechow and Dichev (2002)s accrual quality proxy is used in this study as the measure of EQ. The other variable of interest - analysts scrutiny, or the amount of private information production, is proxied by analysts consensus (Barron et al. 1998) a measure based on forecast dispersion and analysts uncertainty.

This study is the first to examine the relationship between earnings quality and the analysts private information production. By highlighting the analysts use and evaluation of earnings, this study answers Schippers (1991) call for research on analysts' usage of accounting information. Further the study's investigation of the impact of analysts on earnings quality is a reversal of the traditional focus which looks at the effect of earnings quality on analysts. The new twist which is relevant to earnings management studies may also be of interest to regulators in their search for ways to stimulate improvements in reporting quality. Finally, the study is also important as it sheds additional light on the sell-side analysts effectiveness, a matter often debated in the press and in the literature.

Proposal: Deirdre Collier, July 7, 2008
Objectivity and advocacy: Probability theory and capital costing at the Bell System, 1916-1942

This dissertation will investigate the interaction of depreciation theory and probability theory in developing a managerial accounting policy, depreciation accounting, through an historical case study. I examine the depreciation debates of the Bell System and government regulators during the early years of the twentieth century, and how these debates shaped a depreciation policy for public utilities. In analyzing these debates, four broad historical schools of the relationship between specialized knowledge in business management and industry regulation will be examined for insights: Progressive History, Organizational Synthesis, Capture Theory, and Accounting Theory.

As a monopoly, the Bell System was deprived of market pricing information; therefore, management acutely recognized the need for accurate costing information, including depreciation. As a regulated industry, all revenues and expenses were subject to government oversight. Depreciation was an integral element of both the rate base and income determination, key factors analyzed in rate-setting by governmental authorities. Rate regulation involved questions of social justice, because ultimately rate setting determined how the costs of service provision were borne by the utilities, consumers and business customers. The standards used to evaluate firm performance were economy and efficiency, and control of the standards of measurement gave the firm an important tool in its efforts to maintain managerial control against outside interference. Moreover, the ability to manage depreciation provided firm management with an opportunity to smooth earnings, signaling lower levels of financial risk to outside investors.

Unlike accounting controversies which are adjudicated by a professional accounting body attempting to establish general accounting theory, in the depreciation debates, the Bell System advocated for a methodology because of their business needs. Management, therefore, could not obscure its motivations behind deference to professional accounting standards; instead, managerial motivations helped develop professional accounting standards. The use of probability theory, however, did provide the firm with the ability to advocate for positions beneficial to the firm while claiming these positions were scientifically based, not merely self-serving.

Original archival material from the AT&T archives will be used as a documentary source of the position of firm management in these debates. Records from relevant governmental authorities, specifically the ICC and FCC, will be used to document the governmental response. Through examination of these documents, the study hopes to expose the factors involved in determining an important managerial accounting policy.

Proposal: Amy Tong, November 19, 2008

Guidance, guidance and guidance—the discontinuing and restarting phenomenon of quarterly earnings guidance

Forward-looking managerial quarterly earnings guidance, as one kind of voluntary disclosure, provides inside information in a timely manner to the outsider parties. However, a recent trend is that more firms have stopped this practice from year 2000. More interestingly, some of the stop firms have restarted providing quarterly earnings guidance after they publicly or privately renounced this practice. This dissertation proposes and examines two research questions: why firms choose to stop quarterly earnings guidance and why they restart providing quarterly earnings guidance after becoming silent. First, using an industry-year-quarter matched sample of 1610 firms from year 2001 to 2006, this study finds that the management is more likely to stop quarterly earnings guidance when both past and expected future earnings are poor, when expected future earnings are difficult to predict and when less demand comes from the analysts. In addition, it also finds that firms are more likely to stop quarterly earnings guidance if they have fewer independent members and more busy members on their boards, and a higher insider ownership and a higher level of cash proportion of CEOs compensation structure. Furthermore, this study also shows firms are more likely to stop quarterly earnings guidance when the management is over optimistic and more uncertain of their predictions. Second, this study also proposes and examines the determinants for the stopping firms to resume quarterly earnings guidance using an industry-year-quarter matched sample of 342 firms from year 2004 to 2008, and finds that firms in the turnaround situations are more likely to resume quarterly earnings guidance, especially when the past four quarters earnings and expected future earnings become more positive. Secondly, firms are more likely to restart quarterly earnings guidance when the analyst forecast errors and the dispersions among analyst forecasts are smaller. Furthermore, this study finds that firms use expectation management to beat/meet analyst forecast by restarting quarterly earnings guidance, especially when the analyst forecast bias are larger before the firms resume the management forecast. Overall, this study extends and contributes to current literature of voluntary disclosure, corporate governance, analyst forecast, and management decisions by providing more evidences on management motivations and considerations on quarterly earnings guidance.

Accounting Information Systems

14. Yu Cong, September 13, 2004

The relationship between the income statement presentation format and the company characteristics: An exploratory study on the comparability of the financial statement presentation format

In this study, the relationship between the comparability and the presentation format of financial statements is addressed. Specifically, whether a company's selection of income statement presentation format is associated with the company's characteristics is explored to examine if the selection of financial statement presentation format is disclosure relevant.

This study takes advantage of a unique data set that is constructed by a proprietary information extraction system that extracts the presentation format patterns of original income statements in the 10-K EDGAR filings. This type of data is not available from other databases such as COMPUSTAT. By utilizing a document tree model and sophisticated pattern matching techniques, this system is designed to take advantage of the rich contents of the EDGAR database even though the current implementation is concentrated on the extraction of income statement structure and contents.

This study employs the classification of income statement presentation formats used by AICPA as dependent variables while the 2-digit SIC code as well as 32 commonly used financial ratios are used as predictors. Logistic regression and the Classification and Regression Tree technique are used to test the models. The results support our hypotheses and thus serve as the evidences of the association between a company's choice of income statement format and the company's industry and several accounting characteristics ascribed to financial ratios. The results also confirm that the SIC code serves as a good proxy for industry-wide characteristics. The findings suggest that the flexibility in selecting financial statement presentation formats allows companies to better disclose their industry-wide and company-specific characteristics and thus facilitates better disclosure. The findings also imply that such flexibility should not be overlooked in the design of protocols and standards for computer-oriented accounting data transmission and processing such as the XBRL taxonomies.

15. Wei Jiang, Jan 25, 2005

Intelligent day trading agent - A natural language processing approach to financial information analysis

Traders with immediate access to real-time news services (such as Dow Jones News Wire, Bloomberg News Service) constantly monitor and track financial news that is expected to have a significant impact on stock prices. A precondition for any successful news play is fast and accurate analysis of the news content. Manually filtering out relevant news items and performing human analysis within a reasonable timeframe represents a daunting task for a trader due to the fact that news traders are bombarded with large amounts of financial news and reports throughout the trading hours. This research seeks to develop a prototype trading system that automates the procedure of news tracking and analysis. The design of the system adopts an integrated approach using a variety of natural language processing (NLP) techniques to extract the relevant information from merger and acquisition news announcements and generate trading signals based on a set of predefined rules. First, a learning algorithm is employed to identify and classify merger-and-acquisition-related newswire articles from Dow Jones News Wire database. Then the selected news texts are run through an information extraction (IE) system that consists of a series of cascading modules performing in sequence the individual tasks of preprocessing, name entity recognition and semantic analysis. Finally, the system simulates human analysis of all the collected informational elements and produces a trading signal by following the simple rule of "buying the target firm and shorting the acquiring firm".

The core of the IE system is built with hand-crafted rules that are obtained through iterative training process. Following the Knowledge Engineering approach enables us to achieve a high level of system performance, which is critical to the practical application of an automated trading system. Overall, the system reports a precision rate of 98.3% and high scores in other performance measurements as well. Further empirical evidence is obtained to lend support to the hypothesis that the prototype system is capable of capturing a small portion of the post-announcement stock price movement although the bulk of the price reaction is completed within the first two trades.

16. Francisco Badua, July 7, 2005

Pondering paradigms: Tracing the development of accounting thought with taxonomic and citation analysis

This study investigates the paradigmatic structure of accounting research literature by employing various analytical techniques developed in the accounting information systems and econometrics fields. Exploratory Data Analysis (EDA) is used to detect differences in various research paper characteristics, and to group research journals into distinct paradigms according to these characteristics. Various measures based on the Gini Index of diversity are then developed to characterize and evaluate these paradigms.

The analyses are carried out upon the Rutgers Accounting Research Database, a proprietary database summarizing the taxonomic and citation characteristics of major accounting research journals. The results of these analyses lead to ascertaining the existence of distinct accounting research paradigms, characterizing the paradigms according to their topical and methodological characteristics, determining the role each paradigm plays in disseminating accounting knowledge through citation references, and evaluating the intellectual influence of each paradigm. An evaluative metric (optimal taxonomic diversity) is also developed to gauge the contribution of each paradigm to accounting research.

The study concludes that the accounting research network is comprised of several significantly different paradigms, but that these paradigms co-exist in a symbiotic network of citations. The study also finds that accounting researchers value diversity in topical and methodological approaches, as demonstrated by their citation preferences. These findings contrast with the traditional Kuhnian depiction of mutually exclusive and non-communicating paradigms which use narrow sets of research bases and methodologies.

17. Jia Wu, July 25, 2006

Test of details and analytical procedures in continuous auditing

In a Continuous auditing (CA) environment audits are performed on a more frequent and timely basis than traditional auditing. CA is a great leap forward in both audit depth and audit breadth. Thanks to fast advances in information technologies, the implementation of CA has become technologically feasible. Moreover, the recent spate of corporate scandals and related auditing failures drives the demand for better quality audits. New regulations such as Sarbanes-Oxley Act require better corporate internal control and shortened reporting lags. These factors have created an amenable environment for CA development. Especially in the past few years CA has attracted the attention of more and more academic researchers, audit professionals, and software developers. The research on CA has been continuously flourishing. This study extends the prior research by using a real-world case to discuss two essential procedures in CA test of details and analytical procedures.

This dissertation consists of two primary parts. First, it discusses how to apply continuous test of details to detect errors in the business processes of the companys procurement cycle. Second, it proposes new auditing protocols, tests various expectation models, and compares anomaly detection performance using the aggregate and disaggregate data for the analytical procedure in CA. Online learning protocol and error correction protocol are introduced for expectation models to improve anomaly detection performance. Four different expectation models are analyzed in terms of the prediction accuracy and detection performance, which include Linear Regression Model (LRM), Simultaneous Equation Model (SEM), Subset Vector Autoregressive Model (SVAR) and Bayesian Vector Autoregressive (BVAR). The results indicate that error correction protocol generally improves the detection performance. Using disaggregate data can lead to better anomaly detection when the entire error concentrates on a single day or a single location. However, the detection performance would deteriorate when the error is dispersed.

18. Udi Hoitash, April 17, 2008

The effects of social ties and internal busyness of independent committee members on the advising role of boards of directors

The two primary responsibilities of boards of directors are advising and monitoring management. Yet, corporate governance research has predominantly concentrated on agency theory and the monitoring role of the board. Additionally, most studies that examine the work performed by boards' committees do so by examining each committee in isolation, ignoring the interplay between different committees. This dissertation, comprised of two essays, examines the differential association of board characteristics with outcomes that relate to the monitoring as well as the advising role of the board. Additionally, I examine the

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responsibilities of multiple committees, and the consequences of serving on multiple committees on firm value.

The first essay examines, in a common sample, how social ties (constructed from social networks) between management and independent directors affect the responsibilities of both the compensation and the audit committees. Consistent with Agency Theory, I find that social ties between executives and independent directors that serve on the compensation committee are associated with higher CEO compensation. In contrast, I find that social ties between executives and independent directors that serve on the audit committee are associated with higher quality financial reports and higher quality internal controls. This association is consistent with the collaborative board model and the theory of friendly boards that predict that social factors, such as trust and friendship, may encourage rather than obstruct board involvement and effectiveness in administering public companies.

The second essay examines the association of the internal busyness of boards with firm value. In my sample period, boards of public companies are required to have three committees (audit, compensation and nomination), composed entirely of independent board members. Complex committee work in the current environment and fewer board members who can serve on these committees could increase the likelihood that independent directors will not be able to effectively perform their committee work as well as allocate sufficient time to their strategic responsibilities. I find that firms with internally busy boards, those in which the majority of independent directors serve on two or more committees, are associated with lower firm value as measured by Tobin's Q.

19. Silvia Romero, August 8, 2008,

Testing human factor tailored information reports for individuals with different cognitive characteristics

This dissertation reports the results of testing two information presentation structures to produce tailored reports, with MBA students as surrogates for individual investors. The first study results show that individual investors with heuristic characteristics make better investment decisions when they are presented with a summary of numbers and additional information in text, as opposed to presentation formats that provide only numbers. No difference in decision was found for analytic investors, but they felt more satisfied when they received disaggregated numeric information. The result indicates that it is not only numbers what individual investors are looking for, and that the effort that on-line providers put in developing structures to facilitate analysis of quantitative data, should be extended to facilitate access to text disclosures.

The second study compares differences in assessment of companies by analytic and heuristic investors presented with cognitive style tailored information. The information provided was in text format, with one structure organized as object focused abstraction (taxonomy) and the other as process focused abstraction (story). Results show that both analytic and heuristics investors make a different assessment of companies when the information is presented in matching or not-matching formats, and they feel more confident when they receive information in a format that matches their cognitive style. Decision to invest, on the other hand, was affected by the presentation format, with investors in the process focused abstraction more willing to invest, but not by the interaction between format and cognitive style. Additional results show that with a presentation format organized as process focused abstraction (story), investors in general rated the company higher in terms of cash flows, while when the presentation format was organized as object focused abstractions (taxonomy) they rated the company higher in terms of expected future sales. This result indicates that companies might be able to manipulate the information they provide by disclosing in MD&As, which has a structure similar to a process focused abstraction.

Further research is needed to determine the extent of this manipulation and the effect on investors with different cognitive characteristics. Other effects relating the findings and the current reporting environment are discussed. These results have implications for regulators and companies willing to increase accessibility to their financial information.

Proposal: Vasundhara Chakraborty. December 23, 2008

Semi-automatic taxonomy generation procedure and analysis of error logs: The case of pension plan footnotes

Getting credible and timely information is very important in the financial market. However all of the information required may not be available in the statements and instead be hidden in the disclosures. Although Securities and Exchange Commission (SEC) filings can be downloaded from intermediaries in a

computer readable format they are difficult to process automatically because of great variations in the filing structure and terminology. A user may require only specific bits of information but is forced to download the full statements and then search through it. In order to access this information hierarchical formalization of text is essential which in turn needs the generation of a valid taxonomy. One approach to taxonomy generation is the normative approach which considers only the SEC regulations. However prior research (Bovee 2000, Bovee 2005) has shown that there is a need to empirically evaluate and improve taxonomies which can be achieved by using an empirical approach towards taxonomy construction.

The first part of the proposal demonstrates an algorithmic approach to finding an (semi)automated procedure to create taxonomies of financial statements (10K statement); using historical data of Pension plan footnotes.

In the second part the line items in the Pension plan footnote are first tagged using tags from the taxonomy created by the algorithmic approach and then with tags from a taxonomy created by a normative approach. A comparison is made of the success rate of tagging in both these cases and it is expected that the former will have a better success rate of tagging data.

The third part consists of using 10K statements after implementation of SFAS 158 for creating the taxonomy and then studying the error logs(data that cannot be mapped to a tag) to find out whether companies are reporting differently post SFAS 158.

The contribution of this paper can be listed as follows: (i) It helps to ease the very complex and time consuming process of taxonomy creation by using the proposed semi-automatic approach; (ii) Facilitates the use of historical data to construct the taxonomy (iii) It is expected that using historical data will provide a good success rate for tagging data which in turn reduces loss of information, increases comparability of data and consistency of business reporting; (iv) Is expected to show that using historical data for taxonomy construction will provide a good success rate for tagging as compared to a taxonomy constructed by a normative approach.(v) Analysis of error logs is expected to reveal any changes in reporting disclosures by companies after implementation of SFAS 158.

Proposal: Yongbum Kim, December 23, 2008

Continuous monitoring: macro and micro-level control

A company's internal control system (ICS) has been a crucial factor for operational effectiveness and efficiency. A properly designed ICS is to give more reliability to financial information by preventing, detecting, and correcting potentially material errors and irregularities on timely basis. Recently, a series of financial scandals in the late 90s and the early Y2K resulted in the advent of Sarbanes-Oxley Act (SOX, 2002) that mandated public companies to implement sufficient ICSs, and evaluate and report the ICS quality. Although the various requirements are mandated by SOX, there is lack of clear and detailed guidelines about what and how companies should implement internal control (IC) mechanisms into their pre-SOX systems. This study intends to bring some light to these issues by proposing and testing three IC screening models utilizing transactional data of a bank and an insurance company.

The first part of the dissertation discusses a general (or macro-level) screening model that will be applied to all types of transitory bank accounts. The purpose of the model is to determine the particular bank accounts that are likely have either irregularities (i.e., intentional misstatements) or errors (i.e., unintentional misstatements). Since the main goal of the model is to discriminate a portion of transitory accounts from the population, their common or general features will be mainly exploited.

In the second paper, more detailed (or micro-level) screening models will be proposed and tested. The main goal is to alarm particular transactions that have potential irregularities and errors. Since each transitory account has its own unique characteristics in addition to shared attributes, those models will take the both features into consideration. In a sense, the models in this paper are account-specific compared to those in the first.

The last paper of this dissertation will present a screening model for an insurance company. Some findings of the previous two papers will serve as a basis since both companies are in the same industry, bank and insurance. In addition, the insurance company-specific characteristics such as type of wires and their unique policies required by the company will be taken into consideration. Due to the fact that the model has many similarities in common with the previous two models, this study may be a touchstone to show the generalizability of IC screening models, that is, whether an IC screening model in a company can be applied to the others in the same or similar industry with a few modifications.

Business Ethics

20. Miguel Alzola, February 15, 2008

Taking character seriously: Towards a theory of virtue in organizations

Although the constraints on normative ethics are always contentious, many philosophers would agree that a satisfactory prescriptive theory should be rooted in human nature as a matter of psychological realism. There are enough grounds for rejecting a normative conception if it advocates a way of life that is psychologically unrealizable. This principle is especially relevant for virtue ethics, which unlike its main competitors, is offered as a superior ethical theory because it provides a more realistic account of our ethical life. And it is even more critical when applying virtue ethics to the world of business.

Without a sound psychological account of how it is possible for rationally bounded beings like us to be virtuous, virtue ethics might be in trouble and would not be a genuine alternative to standard mainstream moral theory. Yet, a sizable amount of research in social psychology, experimental economics, and organizational behavior, has led a number of social scientists, organizational scholars, and philosophers to challenge the existence and importance of character traits and, consequently, the plausibility of virtue theory. The experimental data, so the argument goes, show that behavior in organizations radically varies with slight situational variations. Therefore, Situationists claim, virtuous behavior is far more situationally variable than virtue ethicists would have us believe.

The empirical test on the existence and determinative influence of virtues on behavior rests on a particular understanding of the nature of character – the reductive view – that defines virtues as behavioral dispositions. This strategy entails the claim that virtue ethics depends on there being individual traits of character that are causally effective in the production of consistent behavior across situations of a certain kind. There are a number of decisive objections against the reductive account. Hence, I shall outline a non-reductive account of virtue, which must be able to explain and predict why people do many of the things they do and to hold people morally accountable for their character and their behavior in organizations.

As a response to the situationist challenge on virtue ethics, I shall argue that Situationism attacks a misleading notion of moral character, which is radically different from the notion of character in the virtue ethics tradition. Furthermore, I shall argue that contrary to the standard interpretation, the experimental data under analysis do not disconfirm the existence or the determinative influence of character traits on the explanation and prediction of behavior in organizations.

Assuming that moral realism is true and that explanations of organizations (and explanations of behavior in organizations) can be psychological or sociological, if they are indeed only sociological – as some organizational scholars argue – then virtue ethics will not have much to do with business ethics. But if moral realism is true and virtue theory is supposed to be a realist theory, virtue ethics is at the very least pretty well suited to business ethics and organization theory because it can bring together the explanation and the justification of behavior in organizations.

If the theory of virtue that I shall develop here succeeds, a number of practical implications arise in the realm of moral responsibility, organizational design, and character education. I shall argue that moral education will be enriched by helping people identify the factors that distort their perception of organizational situations, by training people to develop the skills to selecting the sort of situations they ought to face given the sort of person we should want them to be, and by strengthening people's character to make it a bulwark against strong situational pressures.

DEPARTMENT OF FINANCE & ECONOMICS

Finance

1. Chengru Hu, September 4, 2003

New product development (NPD) is fundamental to stimulating and supporting economic growth for business organizations. Successful NPD investment not only supports important business activities that, over time, contribute to long-run business profitability, but also provides the firm with sufficient cutting edges in competitive battles. This dissertation examines two topics on NPD.

Essay one: Evaluating venture investment with stochastic volatility real option model

It contains two essays. In the first essay a real option model allowing changing product volatility is derived to value NPD investments. Traditional discounted cash flow (DCF) technique suggests that

investment project with discounted cash flow exceeding investment outlay should be chosen, and is helpful in choosing between two alternatives: accept the investment or do nothing. However, NPD investments are dynamic, i.e. decision makers are able to make changes to initial investment strategies at a later date upon then disclosed information. Because decision makers are not obligated to do so, the flexibilities resemble options on real assets (therefore real options). When real options are present, traditional DCF analysis may fail to provide an adequate decision-making.

Essay two: Investor valuation of new product announcements: theory and empirical evidence

The second essay investigates markets valuation of wealth impact induced by firms announcement of new product introductions. Specifically, this essay investigates whether investors realizes real options embedded in NPD projects and valuate them accordingly. Previous literatures on NPD introductions use OLS or GLS to examine wealth impact of new product introduction. However, new product introductions are voluntary activities from decision makers in that announcements are made only if managers possess valuable private information about the product. Therefore, the announcement per se conveys firms private information about true nature of the products. With corporate voluntary event, OLS or GLS estimations may be mis-specified and inconsistent. In the second essay, a conditional (on firms private information0 model would be adopted in the section essay, and results from OLS regression and the conditional model will be compared.

2. Chia-Jane Wang, March 9, 2004

CEO compensation, leverage and corporate board, and their joint impact on firm performance

This paper examines the relationship of CEO's incentive compensation structure with the firm's leverage and corporate board independence, and the joint impact of the three governance mechanisms on firm performance. Most prior empirical related research ignores the endogeneity of managerial compensation and the above listed factors, and accordingly, reported empirical results are not consistent. Specifying a simultaneous-equations model to recognize the endogeneity engendered, we analyze 924 firms over 1992-2000 period. We find that cross-sectionally the sensitivity of managerial compensation to performance is correlated with the leverage ratio of firms. This result is consistent with the theoretical implication of Haugen and Senbet (1981) and Grinblatt and Titman (1989). However, this positive relationship exists for CEOs with low level of share ownership, but not for the CEOs with high level of share ownership. That is, corporate capital structure is nonlinearly related to CEO's pay to performance sensitivity across firms. In addition, our panel data analysis indicates that temporally the CEO's pay-sensitivity is reduced with an increasing debt ratio, supporting the theoretical prediction of John and John (1993). We also demonstrate that the management pay-performance sensitivity and board independence are negatively related with each other, suggesting the two mechanisms may work as substitutes for each other. Finally, when the joint endogeneity and unobserved firm heterogeneity are accounted for, no systematic relationship is being found between the CEO incentive pay and firm value, suggesting the CEO's incentive scheme is chosen endogenously, a result consistent with Palia (2001).

3. Jingfeng Zhang, April 12, 2004

An empirical test for the theoretical basis of the size factor in the Fama-French three-factor framework

The Fama-French (1992, 1993) three-factor (namely, factor loadings on the market, Small-Minus-Big and High-Minus-Low portfolios) model provides a succinct description of cross-sectional variations in stock returns. To date, the Fama-French three-factor model not only has been widely accepted in journal-quality empirical asset pricing research, but also has been incorporated into introductory finance textbooks (For example, Brigham and Ehrhardt, 2001). However, lacking any rigorous theoretical foundation, the Fama-French three-factor "model" is essentially driven by empirical regularities. To justify the pricing of size in multi-factor asset pricing, this dissertation focuses on the size factor within the Fama-French framework, considers the existing theoretical hypotheses related to the size and Book-to-Market effects in the literature, and then empirically tests which hypothesis best fits the underlying data generating process.

The size factor (or effect) in this dissertation is used in both the factor loading and firm characteristics contexts. Assuming rational asset pricing, I focus on testing the default risk factor hypothesis versus the illiquidity/information costs story as the competing explanations for the size factor. The former is proposed by, to name a few, Chen and Chan (1991), Chen, Roll and Ross (1986), and Fama and French (1993, 1995); while the latter is modeled in Amihud and Mendelson (1986), Merton (1987), Easley, Hvidkjaer and O'Hara (2001), and O'Hara (2003). In my empirical study, empirical variables proxying for these two

competing hypotheses are constructed using market and accounting data retrieved from CRSP and COMPUSTAT databases respectively. Then, using both the Fama-MacBeth time series and panel data approaches, I conduct three sets of empirical regression analyses at both industry and overall market level for the period of 1980-1999.

In summary, my results offer supporting evidence for both the default risk factor hypothesis and the illiquidity/information story when they are evaluated alone, but favor the default risk theory when they are examined side by side. Further, among the default risk factors, market-based default risk factors, such as an option-based bankruptcy probability measure and the semi-deviation in returns, are found to provide relatively more information than accounting-based default risk factors such as Altman's (1968) Z-score and Ohlson's (1980) O-score. Finally, my results do not seem to be driven by the survivorship bias or other econometric issues. They are also robust to model selection tests such as log likelihood ratio tests and the Vuong (1989) test.

4. Robert L. Porter, April 26, 2004

Regulatory risk management in commercial banking: an empirical investigation of agency theory

This study presents empirical tests of the joint impact of required capital and management incentive compensation on risk-taking in banking. Two separate branches of the extant literature are unified in this paper. The first branch holds that moral hazard associated with government-backed deposit insurance dictates the use of mandatory minimum capital requirements for commercial banks. The second branch argues that incentive compensation aligns the interests of managers and shareholders thus overcoming the inclination of managers to minimize risk at the expense of shareholder value. We employ a simultaneous equation model to mitigate the endogeneity between risk and the independent variables. The 1988 Basle Capital Accord is recognized as an exogenous shock to the capital ratios of commercial banks while CEO age and tenure are used as instruments for management compensation. The results consistently show a statistically significant negative coefficient on capital and a statistically significant positive coefficient on pay-performance sensitivity.

5. Wan-Jiun Paul Chiou, July 23, 2004

International security analysis, portfolio management, and asset pricing: Theory and applications

A consistent point of inquiry in the field of international finance is the extent to how to accurately catch risk factors in international financial markets. This paper is organized by two studies on international equity markets. First, we examine whether the difference of stock parameters between emerging markets and developed countries and among different geographical areas by using market-level data. Our empirical finding suggests the emerging markets do not significantly outperform. On the other hand, the equity markets in developed countries are less volatile. This persistency of return-risk relation indicates developed countries are more mean-variance efficient, no matter realized or conditional Sharpe index and Treynor index. The geographical variation on risks and performance is obtained. This result also holds when we use GARCH (1,1) model to characterize conditional variance. The results of a test purposed by Lo and MacKinlay (1988) point out capital markets in developing countries tend to less efficient.

The second part of this research is to investigate the difference of stock price performance, risk, correlation with international financial market, and market comovement among several categories of countries. We utilized the U.S. dollar-based yield of 4,916 stocks from 37 countries from 1992:01 to 2003:06 and survey the variation of equity price parameters between developed countries and developing countries, among geographic regions, and among countries. The non-parametric Mann-Whitney test is applied to make comparison among those target groups without being confined by the departures of normality assumption.

On the whole, the stock performances in developed countries, no matter being evaluated by plain U.S. dollar return, Sharpe index, or Treynor index, is higher than the ones in emerging markets. On the other hand, the stock prices in developing countries are significantly more volatile than the ones in developed countries, which are measured by total risk, change of volatility, and international systematic risk. The variations of stock performance and risk among geographic regions also are revealed.

The correlation coefficients of individual stock prices in emerging markets, by and large, are higher than the ones of mature economies because there are more stocks in developed countries negatively correlated with the world market. Consider the absolute value of coefficient of correlation, the stocks in

mature economies are more integrated with the world market. In most countries, especially the countries of larger economic power, there is no significant time trend of correlation change.

The emerging markets are of stronger comovement of stock prices within market is than the developed countries. It is found that the comovement seemingly relates with the financial crises in 1992 and 1998 among the emerging markets. The difference of cross-sectional deviation of stock returns between developed countries and emerging markets is marginal; however, the time-series analysis suggests the significant trend of change on cross-section deviation of stock yields in certain countries.

6. Natalia Reisel, November 15, 2004

Three essays in corporate finance
1. An analysis of alliances in the movie industry

We use a movie industry data set that includes project-by-project information to address the question of the choice of internal project financing versus financing via alliances that span the legal boundaries of several business entities. We find that project risk matters for the choice of financing. Firms develop the safest projects internally, which is consistent with several theories, in particular Robinson (2003). Additionally, we find that riskier firms tend to consider alliance formation. We find some support for the resource pooling and market structure hypotheses, consistent with a few of the notions developed by Lerner. We also consider different contractual features.

Finally, we find that the ex-post performance of projects developed internally does not differ significantly from those developed via alliances.

2. Rating process and notching policy: Implications for senior and subordinated bond yields

The paper presents an empirical analysis of the rating process of bonds. The focus is on the notching policy adopted by the major rating agencies. We argue that rating agencies may choose to provide only a coarse grid, and resort to somewhat arbitrary techniques in refining it. Consistent with our argument, we find that the market systematically prices differently bonds of identical ratings but different seniority. Specifically, we find that yields of speculative senior bonds are higher than the yields of similarly rated subordinated bonds. The sign reverses in most cases for investment grade issues. We control for several other bond characteristics as well.

3. On the value of covenants: An empirical investigation of public bond issues

This paper examines the price effect of restrictive covenants using a large dataset of public bonds issued between 1989 and 2001. We recognize that the decision to include covenants may be determined by the expected gain and control for the endogeneity of covenant choice using the self-selectivity model. We find that covenants that restrict financing activities could significantly reduce the cost of debt. We do not find, however, strong evidence that covenants that restrict investment activities, asset sales and payouts significantly impact bond yields. In some cases, covenants may exist by providing no significant benefits while imposing no real harm in line with Miller's (1977) notation.

7. Jun Wang, February 24, 2005

An empirical study of momentum and reversal in U.S. equity market

Asset return predictability and financial anomalies are focus of a large body of finance literature. Two of the anomalies, stock price momentum and long-term mean reversal, have received much attention in recent years. In this paper, we investigate two issues that are still hotly debated in this field: one is the presence and robustness of mean reversion in U.S. equity market, and the other is the sources of profitability of momentum strategies.

In the first essay, we use a parametric two-component stock price model and a panel based methodology to test for mean reversion. For an extensive use of characteristics-sorted portfolios, we do not find strong statistical evidence in support of mean reversion in U.S. stock market. We find that, if it is ever present, mean reversion exists only in the short and unusual pre-WWII period. To investigate whether mean reversion is important in economic sense, we also implement parametric trading strategies based on predictions of our model, and our findings do not support any economic significance of mean reversion for either individual stocks or stock portfolios. Our results are robust to different model specifications, alternative forecast windows and such considerations as systematic risks and transaction costs.

In the second essay, we propose a risk adjustment procedure appropriate for momentum portfolios. This procedure takes into account the positive covariation between factor loadings of momentum portfolios and the corresponding factor premia, which is largely ignored in the conventional risk adjustment

procedures based on unconditional full-sample regressions. We find that, using our proposed procedure, about 40% of momentum returns from individual stocks and up to 100% of momentum returns from style portfolios can be explained by Fama-French three factor model. We conjecture that stock price momentum could be at least partially driven by fundamental risks, and irrationality may not be the whole story.

8. Bo Liu, February 10, 2006

Two essays in financial economics: I: Functional forms and pricing of country funds.

My dissertation consists of two essays on mutual funds and term structure of interest rate. The purpose of this study is trying to understand investors' behavior from international markets through their investment horizon phenomenon, as well as investors' compensation for inflation risk through the term structure of inflation risk premium embedded from the pricing of TIPS.

Essay one examines the effect of heterogeneous investment horizons on portfolio choices in the global market. Traditional CAPM ignores the discrepancy between observed and true investment horizons. This paper proposes a generalized functional form CAPM model for pricing of international closed-end country funds. A comparison between share returns and NAV returns of closed-end country funds suggests that foreign investors, especially those from emerging markets, have more heterogeneous investment horizons compared to the U.S counterparts. Market segmentation and government regulation do affect the market efficiency. No matter which model we use, the empirical evidence indicates that the risk-adjusted performance of international closed-end funds is negative even before expenses.

II: Inflation, the Fisher equation, and the term structure model of inflation risk premia: Theory and evidence from TIPS

Essay two addresses the question as to what is compensation for investors' bearing inflation risk. In this paper, we study inflation risk and the term structure of inflation risk premia in the U.S. market using nominal interest rate and TIPS. We propose a two-factor CIR model with correlated real rate and inflation rate, and derive the closed form solution to our two-factor model through change of measure with solving a Riccati equation. The analytical formula facilitates the estimation of the model and enables us estimate the term structure of inflation risk premia. We use the Unscented Kalman Filter to estimate the model and explore the relationship between the real rate and the expected inflation rate from 1998 to 2004. The empirical evidence indicates that the implied inflation rate has a similar pattern with those derived from the consumer price indexes and the inflation risk premia demonstrate a steep term structure. Furthermore, we use our model to test the Fisher hypothesis and find that the Fisher hypothesis is supported in the short rates, but there exists a systematic upward bias for the longer maturity rates.

9. Xiaoli Wang. April 17, 2006

Entrepreneur spirit and asset allocation from a risk perspective

Modern finance is based upon investors' receiving greater expected returns from undertaking greater risks. However, literature has been well documenting that entrepreneurs undertake greater risks than their returns would justify. In this dissertation, a new theory is developed to explain the above entrepreneurial risk return puzzle, where extreme entrepreneurial type of investors hold different risk perception than other regular market investors. In my framework, I argue that entrepreneurs or people investing in these closely held businesses are not necessarily acting irrationally. Rather, these individuals perceive risk differently than posited in traditional risk-return models. I also propose that these people usually place a higher value or belief on personally held information or assets under personal control as compared to general public information and these beliefs lead them to assess lower risk regarding such assets. Correspondingly, they require lower returns as compensation and they tilt their investments toward such assets where they have private information advantage or control preference. In this process, a heterogeneous CAPM model is derived that investigates how the heterogeneity in the risk perception influences investors' portfolio choices. The model also provides explanations for other financial puzzles including the size premium puzzle, investors' local bias or home bias puzzle, investor's under-diversification puzzle, and different entrepreneurial behavior patterns in different market regimes, etc.

An empirical test is also performed based on cross-country data and the results provide consistent evidences with the model prediction: countries with higher entrepreneurial activities tend to have more aggregated concentrated portfolio and thus larger level of equity home bias.

10. Hsuan-Chu Lin, April 17, 2006

The structural agency cost under credit risk

This dissertation examines the agency problem caused by credit risk. Such agency problem of debt, structural agency problem under credit risk, is defined as that the firm (shareholders/managers) is able to sell assets to meet a current debt obligation but debt holders lack a monitoring mechanism to protect themselves. This circumstance is equivalent to the situation where shareholders still hold the control of the firm when the firm should have defaulted. Because of its special debtpayout requirement which can be viewed as a safe covenant, Geske (1977) [1] model is adopted as the benchmark in our model. Furthermore, applying the characteristic of compound option pricing of Geske (1977 & 1979) model is able to quantify the magnitude of this agency problem in a meaningful way. As empirical tests, a case study of Lucent Technologies Inc. is analyzed in depth and an empirical study of S&P 500 firms from 1996 to 2004 show that a nontrivial proportion of the observations suffers from structural agency problem under credit risk and that our model captures the major features of the reality. Finally an endogenous default model of Leland (1994) is proved to be the continuous-time Geske (1977) model.

[1] A correction note, Geske and Johnson (1985), is made for Geske (1977).

11. Xiaolin Cheng, June 21, 2006

Asset pricing of credit risk

Credit risk is the risk of reduction in market value caused by default or changes in the credit quality of issuers or counterparties. The credit derivatives and structured credit markets have grown at a great pace. Different approaches to modeling default credit risk have been pursued. The literature on pricing credit risk falls into two major categories: intensity based reduced form approach and equity based structural approach.

This dissertation focuses on how to price the credit risk in reduced form. In particular, I derive pricing formulas for various credit sensitive contracts in analytical forms, with the focus on credit default swap (CDS) and collateralized debt obligation (CDO).

For the CDS model, I extend the quadratic models derived by Ahn and Dittmar and Gallant (2002), Leippold and Wu (2002) to study applications of this model in pricing credit risk. This is the first paper to directly model both interest rate and hazard rate with correlation. The CDS datasets I use are provided by JPM Chase and Creditex. The former one includes credit-default swap premia for one-year, two- year, three-year, five-year, seven-year, ten-year tenors of 433 reference entities actively in the credit-derivatives market during the April 2003 to May 2004 period. The latter one is real transaction dataset for the period 2/15/2000 through 4/8/2003 for 60 firms are used to both test the goodness of fit of the model and provide estimates of the influence of economic variables in the market for credit risky bonds.

For the CDO model, I derive a closed form solution to the problem and also demonstrate the quick technique of FI. Due to high default correlations among assets and rare default events, other methods such as Monte Carlo cannot provide accurate analysis.

12. Xiaowei Liu, December 13, 2006

An empirical study on evidence and sources of international momentum

Momentum investment strategy which buys past intermediate-term winner, stocks and sells past intermediate-term loser stocks generates positive profits over three-month to one-year holding periods. This price anomaly has attracted a lot of attention since it is inconsistent with the traditional Market-Efficiency Hypothesis. This dissertation uses an extensive international data set first to detect the existence of international momentum effect, then to investigate the sources of momentum profits.

To examine the momentum effect in an international context, we implement momentum investment strategies with a sample of about 20,000 stocks from 18 developed countries during 1973-2001. We find that an internationally diversified momentum strategy earns significant positive profits over intermediate horizons. At the country level, most countries in our sample exhibit strong momentum while Asian countries display much weaker momentum effects. We also find that exchange rate movements contribute little to the profitability of international momentum strategies. The momentum returns decrease by about 4-5% across the board when reasonable transaction costs are considered, but they remain statistically and economically significant in most countries.

On the sources of momentum profits, we first examine whether the cross-sectional variation in momentum returns can be explained by some institutional and cultural differences across countries. We

find that momentum returns are negatively related to quality of accounting information and positively related to individualism in each country after controlling for other country-level variables which could proxy for the efficiency of capital markets. Our findings suggest that momentum phenomenon is linked to information dissemination mechanism among investors, which is consistent with the prediction of existing behavioral theories. We also investigate the interaction between style momentum and price momentum. We find no strong evidence of international style momentum. Price momentum in each country has little changed after controlling for possible style effect. Our results indicate that investing style is not an independent source of momentum. Finally, we show that the profitability of momentum strategies does not depend on aggregate market conditions.

13. Yaxuan Qi, May 14, 2007

Essays on household finance and asset pricing

Returns of financial assets are essentially determined by individual household's investment and consumption decisions. The classic consumption-based asset pricing models do not fully address the individual household behaviors because they simplistically assume a representative agent and a complete market. A large number of empirical studies have shown that these models cannot accurately explain the observed asset prices or household portfolio holdings. Researchers have attempted to reconcile theoretical models with the observed data. One stream of research abandons the complete market assumption (e.g., Mankiw, 1986; Constantinides and Duffie, 1996; and Heaton and Lucas, 1996). Another stream of research extends the standard power utility function (e.g., Constantinides, 1990; Able, 1990; Bakshi and Chen, 1996; and Campbell and Cochrane, 1999). This dissertation contains two essays to explore the impacts of household investment and consumption on asset returns from these two perspectives.

The first essay uses a long panel data set to investigate the empirical importance of background risks on a household's asset allocation and on asset returns. A set of household-level background risk variables is constructed to capture the entire covariance structure between financial assets and three types of non-traded or illiquid assets - labor, housing, and private business. These background risks are shown to be statistically and economically important for a household's stock market participation and portfolio choice. When all background risk variables shift one standard deviation from their sample means, a household will decrease its likelihood to participate in the stock market by 12 percent and reduce the proportion of stock holdings by 4 percent. In addition, a stock more highly correlated with background risks is associated with a higher risk premium. Including the background risk factors significantly improves the performance of three benchmark asset pricing models, i.e., the consumption-based CAPM, CAPM, and the Fama-French three-factor model in term of the Hansen-Jagannathan distance and the *J*-statistic of GMM estimation.

The second essay examines the "spirit of capitalism" preference (Bakshi and Chen, 1996) under which an agent's utility depends not only on its consumption but also on its wealth-induced social status. The agent's social status is defined as (i) the absolute value of its wealth (Model 1); (ii) the ratio of its wealth to the average social wealth (Model 2); or (iii) the ratio of its wealth to the average wealth of its social group (Model 3). This paper use U.S. household-level data to study the Euler-equation restrictions implied by these preferences. Empirical results suggest that the utility functions with relative social status (Models 2 and 3) significantly outperform the standard power utility function in explaining the historical stock returns while the utility function with absolute social status (Model 1) does not. Moreover, the inclusion of social status increases the volatility of the implied stochastic discount factor and decreases the implied risk-free rate. Hence, "spirit of capitalism" preference helps explain the excess volatility puzzle and the risk-free rate puzzle. However, this preference does not help explain the equity premium puzzle because the estimated effective risk aversion is still too high.

14. Han-Hsing Lee, June 4, 2007

Two essays in financial economics
Essay I. Empirical performance of the constant elasticity variance option pricing model

In this essay, we empirically test the Constant–Elasticity-of-Variance (CEV) option pricing model by Cox (1975, 1996) and Cox and Ross (1976), and compare the performances of the CEV and alternative option pricing models, mainly the stochastic volatility model, in terms of European option pricing and cost-accuracy based analysis of their numerical procedures.

In European-style option pricing, we have tested the empirical pricing performance of the CEV model and compared the results with those by Bakshi, Cao and Chen (1997). The CEV model, introducing only

one more parameter compared with Black-Scholes formula, improves the performance notably in all of the tests of in-sample, out-of-sample and the stability of implied volatility. Furthermore, with a much simpler model, the CEV model can still perform better than the stochastic volatility model in short term and out-of-the-money categories. The empirical evidence also shows that the CEV model has similar stability of implied volatility to those models tested by Bakshi, Cao and Chen (1997).

When applied to American option pricing, high-dimensional lattice models are prohibitively expensive.

One distinguished feature of the CEV model as opposed to other stochastic volatility models is that it requires only a single dimensional lattice (Nelson and Ramaswamy (1990) and Boyle and Tian (1999)). Therefore, we also compare pricing performances of the CEV and stochastic volatility numerical methods in terms of two aspects: numerical accuracy and computational efficiency. Our experiments clearly show that the CEV model performs much better in terms of the speed of convergence to its closed form solution, while the implementation cost of the SV model is too high and practically infeasible for empirical work. In summary, with a much less implementation cost and faster computational speed, the CEV option pricing model could be a better candidate than more complex option pricing models, especially when one wants to apply the CEV process for pricing more complicated path-dependent options or credit risk models.

Essay II. default prediction of alternative structural credit risk models and implications of default barriers.

Following the seminal works of Black and Scholes (1973) and Merton (1974), the structural credit risk modeling literature has developed into an important area of research in finance. While most of the empirical studies try to test the performance of structural models in bond and credit derivatives pricing, little results are provided for default prediction. Therefore, in this study, we empirically compare four structural credit risk models – the Merton, the Brockman and Turtle (2003), the Black and Cox (1976), and the Leland (1994) models – for their default prediction capabilities.

We adopt the Maximum Likelihood Estimation method proposed by Duan (1994) and Duan et al. (2004), which views the observed equity time series as a transformed data set of unobserved firm values with the theoretical equity pricing formula serving as the transformation. This method has been showed by Ericsson and Reneby (2005) through simulation experiments to be superior to the commonly adopted volatility restriction approach in the literature.

Our empirical results surprisingly show that the simple Merton model has similar capability in default prediction as that of the Black and Cox model. The Merton model even outperforms the Brockman and Turtle model, and the difference of predictive ability is statistically significant. In addition, we also find that the inferior performance of the Brockman and Turtle model may be the result of its unreasonable assumption of the flat barrier. In the one-year out-of-sample test, the Leland model outperforms the Merton model in non-financial sector and the results hold for two alternative definitions of default.

In summary, our empirical results indicate that exogenous default barriers, flat or exponential, are not crucial in default prediction. In contrast, modeling endogenous barrier has significant improvement in long term prediction for non-financial firms. However, we should note that the performance of the Leland model compared to the Merton model is weakened as the default prediction horizon shortened.

15. Arnav Sheth, June 6, 2007

Optimal operating strategies under stochastic cash flows

We solve a series of four stochastic control problems for a firm whose cash flows are a diffusion process (X_t) that includes (individually): (i) Financial distress costs; (ii) Costs of company politics; (iii) Agency costs of free cash flow and; (iv) Physical asset upgrades. Among other things, our results show that: (a) There are several conditions for which asset substitution (risk-taking when close to broke) is optimal, with financial distress costs; (b) When policiticking amongst employees exists, it is optimal to keep the firm extremely small by downsizing frequently and rarely hiring; (c) Increasing the free cash boundary (or equivalently increasing cash obligations) would reduce the agency costs associated with free cash flow from overly negligent managers; (d) It is optimal to have a buffer cash zone before upgrading technologies, rather than as soon as cash reserves exceed upgrade costs. We solve for the optimal operating strategy using an algorithm that includes applying Itô calculus, the use of martingale theory and linear programming. With sparse matrix techniques, a manageable number of constraints and using the MOSEK solver embedded into Matlab, our methodology provides for a quick and easy way by which this class of stochastic control problems can be solved. We provide explicit solutions where it is possible to do so.

16. Yudan Zheng, July 18, 2007

Corporate governance and firm performance

This dissertation addresses two important related questions that have not been fully answered in the existing academic literature. The first question is whether a governance change can lead to an improvement in firm performance. Previous research has found various different governance measures to be correlated with firm performance, while assuming governance measures to be exogenous. These studies then prescribe one or more "good" governance measures that will "cause" firm performance to improve. I directly examine this causality argument by looking at changes in corporate governance and subsequent firm performance. I focus on firms that have the largest changes in governance in order to "stack the deck" in favor of the null hypothesis that good governance changes cause better performance. I, however, find no significant performance differences between the firms with the largest good governance changes and the firms with the largest bad governance changes. Furthermore, more than half of the firms with good governance changes subsequently have negative performance. My results represent strong evidence against the null hypothesis that better corporate governance leads to better firm performance. These findings are robust for: firm performance defined as industry-adjusted stock returns, industry-adjusted accounting profits, asset pricing regression Alpha, Tobin's Q, or leverage, a large sample of firms, and a broad set of governance measures.

The second question is whether governance changes are endogenous responses to changes in firm characteristics and changes in other factors in the contracting environment. I find that governance changes are related to changes in a firm's observable characteristics such as managerial discretion, information asymmetry, firm risk, leverage, and profitability. I also find that the governance changes are driven by movements towards average industry governance levels. Furthermore, a higher level of merger activity in the economy also influences a firm's governance choices. Governance changes, thus, reflect endogenous adjustments to mitigate agency conflicts specific to their contracting environments.

In summary, my findings imply that observed changes in governance are endogenous and do not lead to performance changes. The results are consistent with the notion that firms are in equilibrium with respect to their governance structure.

17. Ronald Sverdlove, July 25, 2007

Essays in the economics of fixed income securities

This dissertation consists of essays on two types of fixed income securities, credit default swaps (CDS) and corporate bonds. The two are related through the fact that CDS are essentially insurance policies that protect the holders of corporate bonds against the possibility of default by the issuer. They are also related by the fact that CDS are used in studies of bond pricing as part of the process of decomposing bond spreads into prices for credit risk, liquidity, and other factors.

In the first essay, we study CDS pricing using two large databases, one consisting of actual quotes and trade prices, and the second consisting of "matrix" or estimated prices. In a number of recent studies, including Longstaff, Mithal, and Neis (2004), an attempt has been made to determine the component of bond spreads that compensates the buyer for the lack of liquidity in the bond markets. In order to do this, it is first necessary to remove the spread that compensates for credit risk. Since CDS appear to be a pure exposure to the credit risk of the underlying entity, their spreads have been used as a measure of the credit risk component of bond spreads. However, we have found evidence in our data that there is also a liquidity factor in the CDS market itself. By analyzing the bid-ask spreads on CDS, we demonstrate that this liquidity factor is significant, being a larger percentage of the price than is common in other securities markets. Because of the rapid growth of the CDS market in recent years, liquidity in the market has been increasing and we see a corresponding decrease in the bid-ask spreads over a two-year period. Furthermore, because of the swap nature of the CDS contract, a small bid-ask spread in a CDS quote will translate into a substantial bid-ask spread in the corresponding bond. As a result, we question the effect of using CDS as pure credit risk to measure bond liquidity. In simulations, we find that the ratio of the liquidity component of a bond spread to that of a corresponding CDS spread can be quite large, especially for high-rated companies.

The second essay is concerned with the seniority levels at which corporations issue bonds and how they are determined. We present a model that shows how interactions between creditor groups in bankruptcy can affect the debt issuance decisions of firms. In particular, we show that firms that issue debt with a specific seniority level may tend to keep issuing debt at the same level to avoid the costs of conflicts

in bankruptcy. Our model also has predictions as to what types of firms may change seniority level in sequential issues. We also find that as bankruptcy costs increase, firms will tend to issue more junior debt. The empirical implications of our model are consistent with the somewhat surprising fact that most firms issue debt at one seniority level only, and quite a few of them cluster at the senior subordinated level. We also find that companies that issue subordinated debt are much smaller than those which issue senior debt, while those that issue at both levels are intermediate on most financial measures. These empirical regularities are broadly consistent with our theoretical analysis. Our model is also supported by the fact that companies that issue only senior debt pay lower spreads than companies that issue at both levels.

18. Wei Yu, July 26, 2007

Two essays on subprime mortgage lending

This dissertation consists of two essays that examine different issues in the subprime mortgage lending market in New Jersey. The following is the abstract of these two essays which are presented as two chapters in this PhD thesis.

The first essay examines lending discrimination in the subprime mortgage market. The recent development of the subprime mortgage lending market allows us to examine implications of the taste-based and information-based theories of discrimination in an important asset class, namely, residential real estate. The existing single equation studies on race-based discrimination in mortgage lending assume race is uncorrelated with the disturbance term in the loan denial regression. At the individual loan-level, we show that race is correlated with both observable and unobservable risk variables and is therefore correlated with the disturbance term. To rectify this problem we specify a system of equations and use a novel econometric technique (Full Information Maximum Likelihood) that *does not need to identify instrumental variables* for system identification. Using a unique data set we find that African Americans and Minorities are no more likely to be rejected than Whites in both prime and subprime markets, suggesting no support for either the taste-based or information-based theories of discrimination. The individual loan-level FIML results are robust with the results at the neighborhood-level which uses two-stage least squares.

The second essay investigates the impact of the New Jersey Home Ownership Security Act (NJHOSA) on the price and quantity of subprime mortgage loans. In doing so, I examine the differential impact of the different stages of the law. Controlling for a broad set of neighborhood demographic, property, borrower and lender characteristics, we find that access to credit for subprime borrowers has decreased after the law was discussed and passed using both loan-level and neighborhood-level regressions. When examining the impact of NJHOSA on subprime loan prices, we find that the subprime interest premium increased after the law was discussed, passed, effective and amended. We construct a unique dataset from a number of data sources, while using the Bloom-Killingworth incidental truncation model to correct for sample selection bias.

19. Wei Wu, July 21, 2008

A study of autocorrelations and other lead-lag effects using game-theoretic efficient market hypotheses

A game-theoretic efficient market hypothesis (GEMH) says that a trading strategy will not multiply the capital it risks substantially relative to a specified market index. This implies that the autocorrelation of returns with respect to the index will be small and that a signal x will have approximately the same lead-lag effect on all traded securities. These predictions do not depend on assumptions about probabilities and preferences. Instead they rely on the game-theoretic framework introduced by Shafer and Vovk in 2001, which unifies statistical testing with the notion of a trading strategy that risks only a fixed capital. In this framework, market efficiency is rejected at significance level alpha when the capital risked is multiplied by 1/alpha or more.

This approach identifies the same anomalies as the conventional approach: statistical significance for the autocorrelations of small-cap portfolios and equal-weighted indices, as well as for the ability of large firm portfolios to lead small firm portfolios. Moreover, the dissertation finds that a certain size portfolio has very different lead-lag effects on other size portfolios than it does on the market. The imbalances are large enough to violate the arbitrage bounds predicted by the GEMH.

Because it bases statistical significance directly on trading strategies, the approach allows us to measure the degree of market friction needed to account for this statistical significance. I find that market frictions provide adequate explanation.

20. Jennifer Kohn, March 10, 2009

A dynamic demand for medical care

I develop a theoretical model to explain observed patterns of medical care demand and test the hypothesis that demand is greater the greater the decline in health at any level of health. Medical care demand is highly skewed: the top 5% of individuals consume nearly 50% of expenditures, and nearly half of lifetime expenditures occur after age 65. Extant economic models don't explain this behavior. For example, Murphy & Topel (2006) suggest the willingness to pay for health decreases with age and illness. Grossman (1972) concludes that we demand less health over time, and maintained assumptions about health transition make observed spikes in medical spending unlikely. Tomas Philipson (2007 iHEA plenary) suggested either consumers act irrationally or economists have not adequately modeled behavior. I explore the latter explanation.

I specify an optimal control model that extends the seminal Grossman (1972) model in three ways. I include the change in health in utility; I model depreciation as an amount rather than a rate; and I allow the health state to increase health production. Contrary to the Grossman model, the resulting demand for health suggests an inevitable disequilibrium as health declines between increasing benefits and *declining* costs of health capital that individuals can only balance by increasing medical care. The time path for medical care demand suggests the change in health rather than the state of health drives increasing demand and that price sensitivity declines over time.

I test the central hypothesis that the change in health is significant using the first 14 waves of the British Household Panel Survey (BHPS). I specify a non-linear seemingly unrelated system of demands for consumption and medical care and impose symmetry restrictions on the cross-price parameters so that inferences are consistent with utility maximization theory. I identify instruments for unobservable health and price using a multiple correspondence analysis. I find support for the theory and the assumption that health and wealth are not separable.

Results suggest single period, single equation models of medical care demand omit relevant variables that capture dynamic decision making and the relationship between health and wealth.

Proposal: Hui-Ju Tsai, November 25, 2008

Optimal consumption and portfolio choice for long-horizon investors with non-tradable labor income when asset returns are predictable

This paper studies the optimal consumption and investment choice for long-horizon investors with non-tradable labor income and time-varying investment opportunities. Investors receive labor income when employed and live on wealth after retirement. There are multiple risky assets with predictable excess returns following a vector autoregressive (VAR) process. Using log-linear approximation, we show analytically that the optimal log consumption-labor income ratio in the employment state and the log consumption-wealth ratio in the retirement state are both quadratic functions of state variables, while the optimal portfolios in both states are linear in state variables, consisting of a myopic demand and an intertemporal hedging demand.

Our calibration shows that more risk-averse investors hold a higher bond/stock ratio in their risky portfolios when labor income is positively correlated with stock return, but the reverse is true when labor income is positively correlated with bond return. The allocation to risky stock inherits the inverted U-shaped pattern of labor income growth with respect to expected time until retirement. These results suggest that the popular recommendations of investment advisors that more conservative investors should hold a higher bond/stock ratio and that the portfolio weight to stock should equal 100 minus age may both lack theoretical justification.

When an exogenous pension account is incorporated into our model, the optimal portfolio in the employment state contains an additional component that comes from the exogenous pension account. The higher the pension wealth relative to total wealth or the more sensitive the consumption in the employment state to the pension wealth, the higher the effect of the pension portfolio on the regular portfolio.
JEL classification G11, G12

Proposal: Samuel Ring, January 30, 2009

A study of corporate debt pricing using real-time prices for comparable instruments

In my thesis, I will compare different methods for predicting bond yields. The study will include all the major parameterized credit model types, both structural and reduced form, as well as two machine

learning methods, support vector machines and defensive forecasting. The information used for prediction will include accounting information, stock market data, and current yields of the firm's other bonds. I will ask which models or methods predict best, and which information is useful for prediction.

Previous work on these questions is very limited. In the case of structural models, bond yields have been used to test models, but the few studies that have considered prediction performance have used only accounting and stock market data. There are a few studies of the prediction performance of reduced form models, but these have used credit default swap spreads rather than bond yields. I have not found any previous work on the prediction of bond yields using the machine learning methods studied here.

As I report in this proposal, I have already gathered the data needed for the study. I have also made a preliminary study of two structural models and the two machine learning methods. In these cases, prediction using current yields for a firm's other bonds is always more effective than prediction using accounting and stock market data. The machine learning methods are also more effective than the two relatively simple structural models considered so far. The reduced form models that will be considered in the completed thesis may perform much better. We also plan to explore additional kernels for the machine learning methods, and this may also lead to better performance.

Proposal: Durga Panda, February 19, 2009

Forward-looking information from option prices

This research proposes methods to compute implied expected stock return and implied beta from option prices. Estimation of expected return is an important part of financial research at least for two reasons. First, it helps determine the cost of capital of an investment of a firm. Second, it is useful for portfolio allocation and balancing. The traditional methods for estimating the expected return are the capital asset pricing model and the Fama-French model that use historical data. Moreover, these models need the unobservable market risk premium to estimate the expected return. Furthermore, these models do not explain any relationship between the time horizon of investment and the expected return.

In contrast to the above models, we provide a forward-looking approach that jointly extracts implied expected stock return (or implied return) and implied volatility from option prices. There are at least two advantages of our approach of estimation of implied return. First, we do not assume a specific utility structure for the representative agent to arrive at our result. Second, the expected return of a stock can be computed without using unobservable market risk premium. Unlike the traditional methods, our approach estimates a different implied return for a different time horizon so that it can be used as the discount rate for a similar time horizon project. Our result shows that the long-term implied returns are closer to historical average returns than the short-term implied returns. Furthermore, it shows a combination of Black-Scholes implied standard deviation (ISD) with our implied return and implied volatility provides a better model, than ISD alone to forecast future volatility of stocks in the short-term.

To analyze the properties of the term structure of implied return we extract its tangents using the nonparametric spline method for S&P 500 index. We then examine the influence of market friction proxies on the level and the tangent of the term structure of implied return. Our initial results show some of the market friction proxies have a significant influence on short-term implied return, but not on the long-term implied return.

We further extend our method to extract implied market beta from this information set. We use the statistical properties of normal and lognormal distribution to extract implied beta from option prices. By using a numerical approach that combines the grid search with Newton-Raphson method we obtain implied beta by minimizing the squared error.

Health-Care Economics

21. Mary Kay Scucci, July 30, 2007

A theory of embedded options: The stochastic intertemporal demand for health in a general equilibrium model with embedded options

This dissertation develops a continuous time general equilibrium model of a simple but compete health economy and uses this economy to posit a "theory of embedded options". The development of this theory is a direct result of a broad and unresolved research issue regarding the robustness of existing pricing formulas to price real contingent claims in the absence of the ability to exactly replicate the payoffs of those particular contingent claims, thus creating imperfect replications.

The first chapters in this dissertation present the foundation for the "theory of embedded options" by developing a general equilibrium model of a complete health economy. By identifying the stochastic intertemporal dynamics of the underlying health process, and the disruptions in the underlying process resulting from illness, the health economy is posited to include an embedded healthcare option which is ingrained in the underlying health process.

This dissertation then simplifies this complete health economy into a two-period model to study the impact of the embedded healthcare option under situations where there is a "full recovery" (i.e., a perfect hedge) of one's health and in situations when there is not a complete recovery of health. The result from the two-period analysis shows that when the "full recovery" assumption is relaxed the payoff of the embedded healthcare option becomes critical. It is shown that decisions regarding the benefit received from an investment in health are impacted by the probability of an illness, the magnitude of the illness, and the amount of health recovered, which are all components of the embedded healthcare option.

This dissertation surmises the existence of embedded options by showing that real options are not economic redundant assets but rather are entwined in the underlying asset. Real options are embedded options and not contingent claims.

DEPARTMENT OF MANAGEMENT & GLOBAL BUSINESS

International Business

1. Nevena Yakova, April 22, 2004

Foreign direct investment as a factor in transition: A study of central and eastern European countries

The issue of foreign direct investment (FDI) in the Central and Eastern European (CEE) transition economies is now probably the most voluminous part of the International Business literature dedicated to the processes in the region although, up to the early 1990s, there have been a general belief that FDI's role in transition could not be that important, that foreign investors would not be interested in long-term projects and that transition was mainly a matter of domestic formal change of ownership and local privatization (Kalotay, 2001).

However, as Dunning (1993), forecasted, the cumulative inflows of FDI into CEE reached $140bln at the end of the millennium. Along with the transformation of the previously closed economies into an attractive FDI host region with a market consisting of approximately 350 million consumers, there was a surge of studies concerned with the trends, role, motives and determinants of FDI in CEE and the entry mode strategies of foreign investors into the region.

On one hand, this increasing pool of knowledge helped us understand major issues and problems arising from this profound makeover of more or less 20 countries suddenly facing the reality of market economy; on the other hand, however, there is still much to learn and there are more questions arising as this process goes on.

The unprecedented phenomenon of transition from 'plan to market' (World Bank, 1996) involves various aspects (economic, political, social and human) that, to a lesser or greater extent, contribute to the achievement of the final goal - the establishment of well-functioning market economies with living standards and competitiveness comparable to those of the contemporary developed countries.

The present study has the following objectives:

1) To trace and econometrically test the pattern of development through FDI of a chosen sample of ten transition economies (Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia and Slovenia) using the theoretical framework of the Investment Development Path (IDP) (Dunning, 1981) and the Industrial Upgrading Model (IUM) (Ozawa, 1993, 2001) of catching-up development.

2) To examine how far FDI has upgraded the competitiveness of the Central and Eastern European transition economies through case studies of a sub-sample of three countries representing the initial ten.

2. Huiping Li, June 7, 2006

The accumulation of technological capability within international joint ventures in China

This study examines the accumulation of technological capability within international joint ventures (IJVs) in China. The study is intended to examine whether IJVs have enabled Chinese state-owned enterprises to transform themselves into organizations with technological capability. The primary motive

for local Chinese businesses to enter into IJVs is to learn and absorb the knowledge and skills of multinational corporations, especially their technology and management systems, so as to enhance the ability to compete. The object of this study is to investigate the extent to which, and the conditions under which, such learning has occurred, how it has occurred, and the outcome of such learning as measured by improvements in the technological capability of local firms.

3. Helena Christiana Barnard, October 27, 2006

Investment from less to more developed countries as a mechanism for capability upgrading in developing country firms

This dissertation is positioned within an evolutionary paradigm in which the distinctive capability bases of firms are argued to be constantly developing. It uses multi-level analysis to demonstrate how that process takes place when relatively less competitive firms from developing countries invest in advanced economies. It confirms the validity of the Penrosian trade off for less advanced firms: Firms struggle with both an actual and a perceived less extensive capability base than their counterparts in the developed world, and therefore struggle to manage the expansion into a context that is both foreign and more demanding. Upgrading does take place, but is characterized by incremental learning that takes place primarily through less formal mechanisms.

Using UNCTAD data, the dissertation demonstrates that investment from less to more developed countries has recently been slowing, except for the most successful developing country firms. An analysis of foreign firms' performance in the USA, using US Bureau of Economic Analysis data, demonstrates that there is a capability gap between firms from less and more developed home countries. Both analyses demonstrate the potential and need for learning in the more developed country. An analysis of self-representation on websites demonstrates that developing country firms actively attempt to shape their social position to increase their credibility among and thus access to the actors who have the knowledge they wish to acquire. Finally, a survey of heads of developing country subsidiaries in the USA finds evidence that new knowledge is created in the host country in response to competitive pressures and closely intertwined with everyday business activities. Although the processes for knowledge creation and sharing are not (yet) formalized, upgrading does take place in an evolutionary fashion.

4. Kwaku Ampadu-Nyarkoh, June 9, 2008

The geography of knowledge sourcing by multinational corporation subsidiaries, with special reference to the pharmaceutical industry

Multinational Corporations (MNCs) are increasingly adopting internationally integrated systems of knowledge creation. Historically, MNCs have concentrated their most creative new competence-generating R&D operations within the parent firm in the home country. The decentralization of research activity in MNCs was directed primarily to the competence-exploiting activity associated with the local adaptation of products and processes. However, since the mid-1980s large MNCs have been continuously expanding some aspects of competence-creating R&D across international borders by establishing global networks of creative subsidiaries that in turn are embedded in their own local networks. Through subsidiaries MNCs are able to tap into foreign knowledge bases by networking with the local firms and non- profit research institutions in centers of technological excellence. The challenge facing the parent firm is to manage the interdependence of highly complex technological activities between network participants to ensure proper coordination for increased innovation. Despite widespread theoretical interest in this phenomenon, progress on empirical research on subsidiary innovation and knowledge-seeking FDI has left many unanswered questions about the geography of knowledge sourcing.

This dissertation examines international knowledge sourcing activity of foreign-owned subsidiaries in the pharmaceutical industry in the United States. The primary focus of this study is to investigate the determinants of local and more distant knowledge sourcing activities by MNC subsidiaries in the pharmaceutical industry. This dissertation explores the geographic origins of the knowledge sources used by foreign-owned subsidiaries in the process of technological innovation. The three main areas of study are the influence which public research institutes have on foreign-owned subsidiaries in their knowledge creation activities; how foreign firms engage in knowledge exchanges between geographic clusters of technological activities; and the integration of local and international networks for knowledge exchanges between firms.

The results suggest that foreign-owned subsidiaries, indeed, tap into the knowledge base of local public research institutes. The findings show that foreign firms extend their knowledge seeking activities beyond their geographic location in other clusters for technologies that are complementary to their existing research efforts. Furthermore, this dissertation shows that basic science knowledge is universal, as scientists actively share their research results with their colleagues across the world.

The data used in this study is obtained from files of the US patent documents of the US Patent and Trademark Office (USPTO) compiled by researchers at the National Bureau of Economic Research (NBER), and the Rutgers University Patent Database.

Proposal: Qiang Xu, February 25, 2005

Multinational corporations & local science base

Globalization and technological advancement in recent decades have created enormous pressure and opportunity for firms to innovate and to develop their technological capabilities. Recent literature of international business research has been commenting on this trend and emphasizing the changing objectives and strategies of multinational corporations (MNCs) that complement, if not displacing the traditional rational of their international operations. The resource-seeking or more directly, competence-creating view of multinational corporations proposes that by strategically allocating their production and research facilities overseas, MNCs are able to benefit from different paths of technological development, hence having significant technological and competitive advantages over their competitors. Empirical researches have gathered growing amount of evidence and new insight into the organizational and strategic implications of this process.

However, existing researches typically concentrate on the development of corporate technologies and technology flows between them, and with some exceptions, largely ignored the role of public science base in the development of corporate technology, which is an integral part of the innovation system that shapes the technological profile of a country or region. The proposed research is an attempt to close this gap. It will be a direct examination of the technological linkages between MNCs and the science base, comprising mainly of universities, government and other non-profit research institutes, of the local country in which they operate. The research draws upon the literature about both the technological activities of MNCs and the technological linkages between science and industry, and will focus on the study of patents citations made by major multinational corporations to the patents granted to major US universities, governmental and other public research facilities. The objective is to find geographical and sectoral patterns of such linkages, and their relationship with certain characteristics of the MNCs themselves, particularly their technological specializations and strength, location and duration of operation in the location.

Proposal: Andy Pore, November 13, 2006

Determinants of degree of externalization in offshoring of services

This study explores the factors influencing the degree of externalization in offshoring of services. Firms could offshore services through a wide spectrum of modes ranging from complete externalization (foreign vendor with no presence in buyer's home country), to complete internalization (foreign subsidiary / captive center, servicing only parent firm and not any other clients), or intermediate modes (licensing, strategic partnership, joint venture etc). The lower the control of firm (buyer) over the source of offshored services, the higher is the degree of externalization and vice versa.

Although factors such as cost savings, improved focus on core competencies, access to skilled resources and technology and improved quality may motivate firms to engage in offshoring of services; concerns regarding security and privacy of data, intellectual property rights, loss of control, loss of inhouse capabilities, rules, laws and regulations of the host country may discourage firms from either offshoring services completely or may force firms to use more internalized modes of operation. Other factors related to the firm such as type of industry, size of firm and type of service being offshored may also play a part in deciding the mode of offshoring.

All these factors related to motives, concerns and other factors are used to build a model to explain the degree of externalization in offshoring of services. Survey data and publicly available data, regarding the above mentioned factors for firms involved in offshoring of services, will be collected to empirically test the model.

Proposal: Pooja Thakur, June 4, 2008

Externalization of clinical trials and their geographical coverage: in-house versus outsourcing versus offshoring

This dissertation proposes to measure the spread of core activities of the pharmaceutical industry and examine the determinants of this spread. Specifically, we look at what factors influence the decision to relocate the clinical trials both organizationally (in house versus external vendors) and geographically (trials conducted in home nation versus trials in foreign countries). A survey of the vice presidents of clinical affairs of pharmaceutical and biotechnology firms will be used for this analysis along with firm level data from COMPUSTAT and Orbis. The research will adopt a multi-level approach and focus on determinants at the country and firm level. The determinants will be drawn from various international business theories such as Eclectic paradigm, neo-institutional theory, organization ecology, and resource based view.

Using panel data from Fast Track Systems, the dissertation will also examine the impact of offshoring and outsourcing on the performance of clinical trials. The study focuses on the period 1997-2005 and will analyze data on clinical trials from 72 firms in the pharmaceutical industry. Performance will be measured at the firm level as well as at the project level. Using multiple case studies, the dissertation will also investigate how firms evolve from conducting clinical trials inhouse to outsourcing and offshoring them. The firms selected for the case studies will fall under four categories: US pharmaceutical firms, non US pharmaceutical firms, large biotechnology firms and small biotechnology firms.

By using a combination of survey data, secondary panel data and multiple case studies, this dissertation has the potential to provide a richer understanding of offshoring and outsourcing of clinical trials. The research will also address the gap in the literature on corporate R&D which has traditionally focused solely on either internationalization or externalization strategies.

Proposal: Feng Zhang, October 7, 2008

The knowledge accumulation of multinational corporations in China

It has been argued that at least some Multinational Corporations (MNCs) have started to extend their global networks, and therefore reconfigure their organizational structure, to incorporate the increasing complexity of knowledge sources required for today's technologies. While China has increasingly become a strategic location for FDI, to what extent have MNC subsidiaries in China been involved in the process of a restructuring of MNC-wide international networks for technology development? This study presents an effort to answer this question by looking at how the characteristics of the technological knowledge being generated, and of MNC international strategies have affected the pattern of knowledge accumulation in their subsidiaries in China, using patent data from the US Patent and Trademark Office (USPTO). Moreover, this study seeks to investigate the effects of technological modularity on the knowledge accumulation of MNCs by comparing the characteristics of USPTO patents invented by the foreign-owned subsidiaries in China with matching patents invented by the peer subsidiaries of the equivalent MNC group in other countries.

Finally, while it has been argued that the development of firm and country level capabilities in modern physical technologies today depends to a large extent on an effective system of public research and higher education, the recent experiences of Japan, Korea and Taiwan, and even those of the US and continental Europe in catching up to Britain centuries ago, all illustrated the role of public research institutes and universities. Given the already high quality domestic human resources in China, this study proposes to investigate whether the Chinese public research institutes and universities have been already sufficiently well developed to play a significant role in the knowledge accumulation process of foreign-owned subsidiaries in China, and of Chinese domestic firms.

Proposal: Ranfeng Qiu, October 15, 2008

The role of general purpose technology in MNC's international innovation network restructuring and technological diversification strategy

This dissertation proposes to map the technological and geographical patterns of large multinational's international innovation network, and explain its re-structuring process by involving the concepts of General Purpose Technology (GPT) and new techno-economic paradigm. The research will adopt a multi-level approach focused on industry level, MNC group level, subsidiary level and host country level respectively. This dissertation will be constituted by three separate but interdependent empirical studies

based on both patent count and patent citation data drawn from Reading University and Rutgers University Patent Database. The propositions will be drawn from various economics, international business and organizational management theories such as evolutionary economics, Electric paradigm, resource-based view, technological management theory, etc. This research, by linking the concept of GPT and new techno-economic paradigm to multinational management theory, has the potentials to address the gap in conventional MNC theory, which has been focused either on MNC internationalization or on technological diversification. It will also enrich the literature on the evolution of MNC subsidiary roles.

Organization Management

5. James Stryker, December 23, 2003

Designing the work place to promote communication: the effect of collaboration opportunity on face-to-face communication in R&D project teams

Verbal communication- defined to include both spoken and written communication- has long been considered an important medium for the transfer of information between organizational members (Bales & Strodtbeck. 1951; Hoffman, Harburg, & Maier, 1962; Pelz and Andrews; 1966; Allen, 1977; Mintzberg, 1979, Tushman, 1979). Although electronically mediated communication has become an increasingly important part of organizational communications systems, Allen's work (1977, 1998) has underlined the importance of old-fashioned, face-to-face communication for the successful accomplishment of team activities.

The objective of this research study was to quantitatively determine the effect of the design of the workplace environment on work-related, face-to-face (FTF) communication. The principal hypothesis of this study was that work-related FTF communication would be greater in open-plan, high visibility, high headcount density work environments if the work environment included free, unoccupied space for both informal and formal collaboration. This physical structure variable was called *collaboration opportunity*.

The study found that high visibility workstations promoted both team and non-team communication and FTF communication increased when high visibility workstations were moderated by high headcount density and high layout efficiency. The study also found a significant correlation between collaboration opportunity and team FTF communication. Further, collaboration opportunity was found to promote team communication for *low visibility* workstations when moderated by headcount density and open work stations, compared to closed offices, were found to promote team communication in situations with low visibility workstations. Also, a significant percentage of FTF communication (46%) was reported as taking place in corridors or other formal or informal meeting areas outside the workstation. Implications for the design of future work environments include recognition of the importance of workstation visibility in promoting FTF communication as well as recognition of the role informal meeting places play in promoting serendipitous interaction and collaboration opportunity.

6. Yong-Sik Hwang, March 30, 2004

The evolution of alliance formation: an organizational life cycle framework

This study will investigate the evolution of strategic alliances by adopting an organizational life cycle framework. Specifically, we develop research around firms alliance formation patterns, contending that these patterns will change across the stages of an organizational life cycle. Rather than treating it as a single broad concept, alliance formation will here be viewed in terms of specific aspects such as alliance objectives, partner type, alliance mode, international alliances, and resource creation aspect. We classified organizational life cycle stages as birth, growth, and maturity stages by adopting previous organizational life cycle frameworks. Corresponding hypotheses are tested using archival data of 216 biotechnology firms that entered 5463 alliances during 1991-2001 period. Our study found strong evidence that alliance formation actively takes place at the birth stage of life cycle. With respect to alliance objectives, firms are more inclined to form exploration alliances at the birth stage and exploration alliances at the growth or maturity stage. The result also suggests that firms are more likely to form non-equity alliances at the birth stage and equity alliances at the growth stage. The firms tend to ally with strategically similar partners at the birth or growth stage, and ally with strategically dissimilar partner at the maturity stage. It turned out that firms form international alliances regardless the stages of the life cycle. In addition, we found that the relationship between alliance formation and resource deepening was most positive and significant. This research will also offer a contribution to business practitioners, whose most urgent task is to make their

firms grow and become stable. By observing strategic alliance formation patterns through life-cycle stages, it may be possible to predict the major problems, decisions, and opportunities associated with alliances. Overall, this study provides evidence of sequences of activities that firms tend to follow in evolutionary process as they form alliances.

7. Dong Chen, March 30, 2004

Governing for success: An examination of different types of parent control in international joint ventures

    The purpose of this study was to examine how parent firms exercise control over international joint ventures (IJVs). Using an integrative approach, I developed a general framework of parent control in IJVs, including output control, process control, and social control, exercised by both foreign and local parent firms. The major antecedents of each type of parent control were identified by investigating parent firm attributes, inter-parent relations, parent-IJV relations, and contextual factors. This theoretical framework was examined using original survey data on 259 IJVs in China. Empirical findings suggested that parent firms modify their control over IJV operations to accommodate different internal and external conditions. Specifically, foreign companies tend to rely on output monitoring and social regulation to ensure financial returns, and on process surveillance to explore new opportunities, while Chinese partners utilize process control for knowledge learning. Both foreign and Chinese parent firms equity share and general competence help them perform all types of control, but only unexpected intangible resource contributions (relationship-based resources for foreign, knowledge-based resources for Chinese) can increase process and social control. In response to goal incongruence with mistrusted partners, foreign parent firms tend to seek all types of control, but Chinese parent firms only stress on social control. To influence IJVs of high importance or parent-dependence, parent firms tend to apply output and process control rather than social control. Moreover, these relationships in concern are moderated by IJV life stage and market situation. In addition, the research results showed that the three types of parent control are related with IJV performance in different ways. Output control is not always beneficial given that foreign and Chinese parent firms have dissimilar outcome preferences. The non-positive impacts of process control suggest that IJVs need to have adequate operational autonomy. And social control is largely positively associated with IJV performance. Overall, this study indicatedthe distinctive features of each type of parent control and provided important implications for the design and implementation ofparent control systemsin IJVs.

8. Rochelle Parks-Yancy. April 16, 2004

The effects of social capital resources on the careers of diverse groups

    Prior research has found that access to social capital resources significantly affects career outcomes. However, insufficient attention has been given to how access to social capital resources may differ for groups defined by gender, class, and race/ethnicity and how these differences affect the groups acquisition of social capital resources and the returns to their careers. Using qualitative and quantitative data, I find that men, whites and, less so, the middle/upper middle class have greater access to social capital resources than women, blacks, and the working class. Given their early and extensive access to social capital resources, advantages accumulate to men, whites and the middle/upper middle class over the course of their careers, while disadvantages accumulate to women, blacks, and the working class, as well.

9. Elizabeth McCrea, June17, 2004

Aligning product development and business strategy

    Alignment between the new product development (NPD) and business strategy processes is a significant contributor to success. Developing new, innovative products is a means to accomplish strategic objectives (e.g., Brown & Eisenhardt, 1995; Dougherty, 1992; Lengnick-Hall, 1992), and learning derived from NPD activities is a means of adapting firm strategy to changing markets and advancing technologies (Eisenhardt & Tabrizi, 1995; Schoonhoven, Eisenhardt, & Lyman 1990). Yet many firms have difficulty keeping these complex processes synchronized: products are developed that fail to achieve strategic business objectives (e.g., Cooper and Kleinschmidt 1987; Dougherty and Heller 1994; Dougherty and Hardy 1996), and strategies are devised that fail to incorporate the knowledge learned during product innovation activities (Kearns and Nadler 1992).

    I mapped elements of the product development and business strategy literature to Weicks (1995) organizational sensemaking types to create three distinct alignment processes: (1) planning, based on generic sensemaking; (2) interactive, based on intersubjective sensemaking; and (3) influence, based on a

combination of intrasubjective sensemaking and sensegiving (Gioia, Dennis & Chittipeddi, 1991). I derived three factors for each approach that would facilitate alignment (e.g., formal procedures, iterative communication, empowered employees) and three factors for each approach that would hinder alignment (e.g., process non-compliance, organization fragmentation, core rigidities), for a total of 18 factors. Then I used data regarding 63 development projects taken from 117 interviews, myriad documents and observations, to test the validity of the framework. In general, respondents mentioned more facilitators than barriers in the ultimately aligned projects, and mentioned more barriers than facilitators in the projects that were unaligned when they concluded.

10. Nareatha Studdard, June 21, 2004

The entrepreneurial ventures social interaction with the business incubator management and the relationships impact on firm performance

This cross-cultural research project, involving the United States and Finland, explores the factors of success that high technology entrepreneurial ventures encounter when linked with a university business incubator. Business incubators are organizations that serve to promote the economic development of a region. Universities establish or closely link themselves with business incubators to commercialize innovative activity. This research examines how the social relationship that develops between the incubator manager and the high technology entrepreneurial firm impacts the performance of the firm. It is hypothesized that the established social structure of the university business incubator will have a positive impact on the firm acquiring business processes knowledge. And, the acquisition of the business processes knowledge will have a positive impact on the overall productivity of the firm as well as its technological capabilities. This study found that firms acquire knowledge from the incubator manager. However, this does not always translate into the primary reason for a firms success. The most useful knowledge an incubator manager can share with a firm is business knowledge preferable to technical knowledge. Lastly, the reputation benefits of joining an incubator are very advantageous to entrepreneurial firms associated with business incubators.

11. Joanne L. Scillitoe, June 21, 2004

Technological learning of new technology-based ventures in the context of university-linked technology incubators

New Technology-Based Ventures (NTBVs) serve a critical role in the development of local, region and national economies through innovation, the creation of new and high quality jobs, and/or the generation of profits. University-linked Technology Incubators (UTIs) are new organizational forms that seek to promote economic development by providing affiliated NTBVs with opportunities for preferential access to various resources, including university knowledge, needed for successful development and growth. While recent research suggests that UTIs have a positive impact on the success of affiliated NTBVs, there is no clear consensus on what UTI practices and offerings enable NTBV success.

Drawing from the entrepreneurship, UTI, organizational learning, and social capital literature, this dissertation presents a conceptual model and empirical analysis of what UTI characteristics and NTBV social ties within and beyond the UTI enable the technological learning of UTI affiliated NTBVs. Technological learning is the measure of success used in this study as an early indicator of innovation. Results of this study, based upon a sample of NTBVs and UTIs in the U.S. and Finland, suggest that a smaller UTI client portfolio enables greater NTBV technological learning. A smaller client portfolio permits UTI management to spend more time with each NTBV and provide individualized support that enables technological learning. However, results also suggest that fewer industries associated with the UTI and a larger size of the UTI network do not enable NTBV technological learning, as suggested by prior research. In addition, study results suggest that NTBV frequent ties with university researchers, established firms within industry, and business consultants enable technological learning. However, enduring ties with these actors do not enhance technological learning. This suggests that NTBVs may not need pre-existing relationships with these actors prior to UTI affiliation or long term affiliation with the UTI for technological learning. However, results suggest that NTBVs do not gain technological learning from through frequent or enduring ties with UTI management, other ventures, funding agencies, venture capitalists, or angel investors.

12. Scott Newbert, June 23, 2004

Creating value through entrepreneurship: A reconceptualization, theoretical extension, and conceptual level empirical investigation of the resource-based view of the firm

The resource-based view (RBV) is one of the most widely accepted bodies of thought in the strategic management field and beyond. Despite its appeal, however, many critics suggest that certain limitations have hindered its acceptance as a theory of the firm. Rather than recount the many critiques of this perspective, this dissertation will address four such limitations: (1) that the currently accepted methodological approach is incapable of testing the RBV, (2) that those factors that facilitate the commercialization of value are exogenous to the resource exploitation process, (3) the RBV under-specifies the resource exploitation process, and (4) prescriptions for firms regarding how to create value are absent in the RBV.

In order to maximize the utility and value of the present dissertation, it also offers the following four prescriptions to these challenges. Specifically, this dissertation (1) suggests that the RBV should be tested at the conceptual level and describes a study designed to do so, (2) reconceptualizes the dependent variable of the RBV as the creation of value, (3) draws on the entrepreneurship literature to suggest that value may only be created by the novel combination of valuable resources, and (4) examines the value creation process through an organizational adaptation lens to identify the antecedents to this process.

In so doing, this dissertation develops conceptual arguments and presents a multi-stage model suggesting that a firm can only create value through the novel combination of valuable resources. Since this process is often complicated in the face of radical environmental change, it may only be accomplished in the presence of entrepreneurial capital, entrepreneurial management, and resource access. The subsequent empirical analysis lends support to the model hypotheses, suggesting that this reconceptualization of the RBV may provide a more dynamic understanding of the value creation process than currently exists.

13. C. Helen Takacs, June 6, 2005

Technology sourcing in the medical devices industry: The role of technology characteristics and organizational context

The focus of this study is technology sourcing in the new product development process, and, specifically, how characteristics of the technology influence the sourcing decision. The five technology characteristics investigated in this study are the resource characteristics associated with the resource-based view of the firm rarity, inimitability, nonsubstitutability, and value and maturity. Also considered are two aspects of the organizational context that may moderate the relationships between technology attributes and the sourcing mode. The first of these organizational aspects is the extent to which the firm follows an incremental or a radical innovation strategy. The second is the extent to which the firm operates under an open innovation model. Data were gathered in exploratory interviews with R&D executives in Finland and the U.S. and, for hypotheses testing, through surveys of R&D executives in the U.S. The study is confined to a single industry, that being the medical devices industry, and the unit of analysis is at the level of the individual technology. Support is found for the hypothesized relationship between value and internal sourcing and for the interaction effect between value and open innovation. Partial support is found for the relationship between inimitability and internal sourcing. None of the other hypotheses are supported. The findings of this research appear to place a boundary on the resource-based view with regard to its applicability to strategy implementation issues such as technology sourcing decisions. And, in a supplemental path model analysis, a complex relationship was found to exist among the four attributes associated with the resource-based view of the firm in which inimitability and nonsubstitutability lead to rarity, rarity leads to value, and value leads to internal development of the technology.

14. Yanli Zhang, April 2, 2007

International business connections, domestic inter-firm networks and corporate technology development paths of Japanese firms

My dissertation explores three interrelated questions in the context of large Japanese firms: first, what is the role of international business connections in corporate technology development; second, what is the role of domestic inter-firm networks; and third, how do international connections and domestic inter-firm networks interact in the process of shaping corporate technology development? Furthermore, I study how this three-way relationship between international connections, domestic inter-firm networks, and corporate

technology development has changed historically, from the interwar years (1920s-late 1930s) to the present.

The dissertation shows that international business connections have played an important role in the catch up experience of Japanese firms. Furthermore, domestic inter-firm networks during the stages of catch up, used to interact favorably with international connections and facilitate the technology transfer from foreign firms. However, the dissertation also shows that after Japanese firms had caught up with firms in the western countries, the role of its domestic inter-firm networks gradually shifted and began to show more of the constraining side in terms of establishing open international connections and global learning.

Furthermore, the findings in this dissertation suggest that we need to take into account the underlying nature and mechanisms of a network when considering its impact on firms' knowledge access and innovation abilities. More specifically, it is shown that belonging to a horizontal network or a vertical network tends to have subtly different influences on firms' innovation and global learning. In summary, this dissertation highlights the importance of considering the specific time, context, and nature of the phenomenon in examining the roles of international connections and domestic institutions on firms' paths of technology development.

The main data source is the US patent data, which offers the primary evidence for the evolution of technological profiles and the global learning of Japanese firms. Keiretsu affiliation information is combined with patent data to analyze the effects of keiretsu networks on firm technology development and global learning. In addition, since patent data are only available after 1969, two other sources of data (historical accounts and technology licensing data) are used to supplement the primary data source to provide a historical perspective on the technology transfer through inward foreign direct investment during the interwar period and technology licensing during the postwar period.

15. Yi-Yu Chen, April 16, 2007

Effects of technology cycles on strategic alliances

This study examines various issues related to the formation of strategic alliances by using the cyclical model of technological change constructed by Tushman & Anderson (1986). Technology cycles offer a useful evolutionary perspective on shaping technology trajectories. The evolution of technology is a result of technological, social and political factors. The four stages in the model include technological variation (stage I), era of ferment (stage II), technology selection (stage III), and technology retention (stage IV). Within each of the four stages, issues related to the formation of strategic alliances motivations, governance modes, and the selection of partners are explored. The association between the cyclical model of technological change and the formation of alliances is empirically tested in response to the statement that a missing link exists for empirically validating the model of technology cycles.

Specific research questions include: How will the context of cyclical stages of technological change affect the formation of strategic alliances? In other words, will different types of resources and capabilities be most valuable at different stages of technological change? How well does Tushman and Andersons theory of technology cycles explain technologys impact on the formation of strategic alliances?

Data were 594 alliances in the semiconductor industry from the Securities Data Corporation. Findings showed that the model of technological change is a useful framework in studying strategic alliances. More specifically, at the technology variation stage, innovation-driven alliances are the most important motives. Firms lack of promising technologies tend to select firms with promising technologies. Firms with promising technologies tend to select firms with complementary capabilities. At the era of ferment, both innovation- and efficiency-driven alliances for old technologies are the most important motives. Dominant industry players in either the semiconductor industry or other industries surprisingly are not the favorable alliance partners. At the stage of technology selection, manufacturing-type of alliances for new technologies are the most important motives. The more frequently adopted alliance modes are the ones with high control mechanisms and with equity involvement. Partners located either upstream or downstream the focal firms are the most favorable choices. At the technology retention stage, market-driven alliances are the most important motives. However, firms in different industries or established firms in targeted markets are not favorable alliance partners.

This study contributes to the literature in two ways: First, it empirically tested the cyclical model of technological change by Tushman and Anderson (1986) and linked the effects of technology cycles with studies on strategic alliances. Second, it empirically validates the argument that certain types of resources are most advantageous under particular technological conditions at various stages of technology cycles. The model provides rich settings to study how firms cope with their technical environment.

16. Danielle D. Dunne, April 24, 2007

Inside-out or outside-in: learning and collaboration in the new product development process in the bio-pharmaceuticals industry

In this dissertation I study a very complex innovation process, the discovery of new drugs to treat human diseases. The work of innovation in the bio-pharmaceuticals industry, like all other industries, depends on the continual creation and application of new knowledge (Leonard-Barton 1995). The focus of this dissertation is the process of creating and using new knowledge, in other words, the process of learning for innovation. The learning process in this industry has three unique characteristics because it involves knowledge that is science-based, hugely uncertain, and distributed in a number of different firms. In order to uncover the intricacies of learning in this industry I explore three processes typically emphasized by innovation scholars. These are the processes of search, integration, and sensemaking within and across organizational boundaries.

Using grounded theory building methods and drawing on 99 interviews, I explain the unique learning processes in this industry. I do so in the hopes that once articulated these processes can be improved. Also, existing theories of learning for innovation need to be enhanced in order to explain how learning works when knowledge is science-based, hugely uncertain, and distributed in a number of different firms. I also explain that in order to learn across organizational boundaries in alliances the processes of search, integration and sensemaking must be leveraged in alliance relationships. I draw on the contrast between these processes in technology versus science based industries to explore the challenges of learning in this industry. I find three new ways that search, integration, and sensemaking occur for bio-pharmaceutical scientists: they find new ideas and understandings by searching for clues in an emergent yet deliberate fashion; they integrate these ideas and understandings by iterating and re-iterating across disciplines and functions to package the clues into a whole; and they make sense of what they have learned by drawing on their cerebral intuition in a collective way, the collective sense of the scientist. I also find that there is very little truly innovative learning in alliances, but if these processes are enabled across organization then truly innovative learning in alliances has the potential to make an important contribution to the discovery of new drugs within and across firms. But, existing best practices for alliance management create barriers to truly innovative learning in alliances. There is evidence in this study that these barriers may be easily moved.

Bio-pharmaceutical scientists and managers must embrace the unique learning processes of search, integration and sensemaking that I find in this study, specifically: searching for clues, iterating and re-iterating, and the collective sense of the scientist if they going to create a continual flow of new knowledge through their organization. They must leverage the inherently exploratory process of search to bring in more and better ideas, help scientists connect with each other and share their ideas, empower the sense of the scientist in strategic and organizational decisions, and finally break down the barriers to search and iteration across organizational boundaries.

17. Liuba Y. Belkin, April 25, 2007

Emotional contagion in the electronic communication context in organizations

Prior research has shown that interpersonal electronic communication influences individual emotions and attitudes, which in turn can influence individual and team performance. Even though the research in the field has significantly contributed to our understanding of emotions and emotional contagion in face-to-face settings, a lot of questions persist regarding the dynamics of the emotional contagion process in the electronic communication context. The purpose of this research project is to diminish the existing knowledge gap on the topic of emotional contagion in the electronic communication environment in organizations, by proposing a theoretical model and conducting a systematic quantitative study and an exploratory field study.

Specifically, drawing on social contagion theory and definitions (Levy & Nail, 1993; Thompson & Nadler, 2002) I propose that individual emotional displays in a dyadic electronic communication will a cause different degree of interpersonal emotional contagion depending on the valence of expressed emotions. Resulted emotional contagion in the electronic communication context is predicted to mediate individual emotional, attitudinal, and performance outcomes. In addition, (1) the stage of personal relationship and (2) individual positional power are predicted to influence this online process.

Based on the proposed model, both a field study and a laboratory experiment are conducted to test the outlined hypotheses. The findings of the experimental study indicate that emotional contagion phenomenon can exist in the electronic communication context and that positive emotions can be more contagious than

negative emotions online. In addition, displayed affect, both positive and negative, can be beneficial for individual and joint performance in the short run. The data from the field study is consistent with the experimental study results and also demonstrates that people regularly encounter affective displays online in their professional life. Overall, my findings provide some support for the proposed model of emotional contagion in organizations. Theoretical and practical implications, as well as limitations of the present research and future research directions are also discussed.

18. Deepa Aravind, March 27, 2008

Variations in implementation of certifiable management practices across certified firms: An examination of the determinants and consequences of ISO 14001 implementation

This dissertation examines the facility-level implementation of a management practice that is being adopted by many firms worldwide, the ISO 14001 environmental management system (EMS). ISO 14001 is a standard developed by the International Organization for Standardization that codifies practices for managing the environmental aspects of firms operations. Firms can obtain certification to the ISO 14001 standard by passing an audit by an independent third-party auditor. While many studies have examined the antecedents and consequences of ISO 14001 certification very few studies have examined the implementation of ISO 14001 in certified firms. However, early evidence suggests that variations in ISO 14001 implementation exist among certified firms and that firms may be able to take advantage of weaknesses in the auditing system by obtaining and maintaining certification without continuously adhering to the ISO 14001 requirements. This suggests the need to more systematically examine the antecedents and consequences of the quality of ISO 14001 implementation.

This dissertation is comprised of three studies. In the first study, I examine institutional and resource-based determinants of the quality of ISO 14001 implementation at the facility level. In the second study, I draw on agency theory and the innovation literature to examine whether ISO 14001 adoption can lead to innovation in addition to routinization that is normally associated with rationalizing practices such as ISO 14001. I also examine the effects of corporate policies - rewards, monitoring, and importance of environment in corporate strategy - on both routinization and innovation. In the third study, I draw on the environmental management literature to examine the effects of the quality of ISO 14001 implementation on the environmental performance of certified facilities.

Using data that I collected via a mail questionnaire survey of 192 ISO 14001 certified facilities in the United States that I augmented with secondary data, this dissertation contributes to institutional theory by finding evidence that resource-based factors offer further insights to variations in implementation of management practices in addition to institutional factors. Further, I find that both routinization and more exploratory innovation can arise as a result of adopting ISO 14001. I find that corporate policies are significant predictors of routinization and innovation at the facility level and that facility management support mediates or partially mediates the relationships between corporate policy variables and routinization and innovation. Finally, I find that the quality of ISO 14001 implementation has positive effects on environmental performance, indicating that studies in the environmental management literature need to pay attention to ISO 14001 implementation in addition to its adoption.

19. Dorothy M. Kirkman, April 17, 2008

Dedicated biotechnology firms in the ivory tower: An examination of the relationship between entrepreneurial orientation and university collaborations

The purpose of this study is to understand how senior managers' entrepreneurial behaviors influence a biotechnology firms participation in university collaborations. Universities are attractive collaboration partners because they: (1) employ scientists who possess cutting-edge knowledge and (2) make considerable investments in research. Biotechnology firms collaborate with universities by acquiring licenses, sponsoring research contracts, and hiring university faculty as consultants. Existing management literature provides rich theories that explain a firms motivation to ally (Ahuja, 2000). However, few empirical studies have explored entrepreneurship as a potential explanation for a firm's motivation to ally.

To develop a comprehensive understanding of university-biotechnology relationship, this study examines a biotechnology firms entrepreneurial orientation (EO), which reflects top managers risk-taking propensity, willingness to innovate, and desire to lead rather than to follow the competition (Miller, 1983; Covin & Slevin, 1991; Wiklund, 1999; Wiklund & Shepherd, 2003). Extant studies explore the EO-performance relationship. However, exploring the EO-performance relationship may not be germane to

biotechnology firms because it takes 10-15 years to commercialize new therapies and earn profits. DeCarolis and Deeds argue that the performance of biotechnology firms should depend on both their stocks of knowledge and their access to flows of knowledge (1999: 955). Building on this premise, I put forth the notion that a biotechnology firms EO may influence its ability to earn profits and its desire to use university collaborations to gain access to cutting-edge knowledge.

This study adopts two conceptualizations of EO to explore university collaborations. The first conceptualization represents the traditional view of EO as a configuration (Miller, 1993, Covin & Slevin, 1991; Wiklund, 1999; Wiklund & Shepperd, 2001). Scholars who follow this traditional perspective put forth the notion that EO is a uni-dimensional construct and that a firm must possess all three dimensions to be entrepreneurial. A later conceptualization but forth by Lumpkin and Dess (1996, 2001) opposes the traditional view by maintaining that EO is a multi-dimensional construct and that a firm may possess one or all dimensions in order to act entrepreneurially. The traditional conceptualization of EO is used to explore the existence of a relationship with EO as well as establishing moderating conditions. In this study, the later EO conceptualization is employed to explore the relationship between the individual relationship between the three dimensions of EO and specific forms of university collaborations.

Data were gathered by conducting exploratory interviews with the Directors of University Technology-Transfer Offices, field research at biotechnology firms, and a pretest conducted with pharmaceutical industry executives. The hypotheses were tested by administering a survey to senior R&D executives at U.S. biotechnology firms. The findings fully support the core hypothesis that a biotechnology firms EO positively influences its participation in university collaborations and offer partial support for the moderating and individual dimensions hypotheses.

Proposal: Shalei V. K. Simms, August 1, 2008

Why who you are at the time matters: The effect of social identity on risky decision making

Risky choice is an integral part of the strategic decision making process. It encompasses both organizationally and personally relevant outcomes. Individual decision makers must navigate the process in such a manner that yields optimal results for the organization as well as the individual decision maker. As a result, it is important to further uncover additional antecedents to strategic decision making in organizations.

The goal of this dissertation is to examine how salient social identities, or the social identity that is psychologically active at the time a decision is made, influences the risky decision making process. Specifically, I explore the question of whether individuals in a particular social group change their risk taking depending on the context that activates their social identity. I argue that individuals will be more likely to make a risky decision when their identity puts them at an advantage (positive social identity) than when they are put in a disadvantageous position (negative social identity). In addition, I argue that identity orientations, or whether an individual views himself as separate from or a representative of their social group, influence risky decision making. Boundary conditions to these relationships will also be discussed.

Proposal: Guozhen Zhao, November 19, 2008

What make some managers behave more fairly than others towards their subordinates?

In this proposal, I try to probe into the question that why some managers behave more fairly to subordinates than other managers. And I propose a general model which tries to analyze the possible underlying mechanisms. I argue that a manager's fairness behavior is determined by his personal dispositions at the individual level, the context in which he works, and the factors of his subordinates through three basic mechanisms, i.e., a manager's long-term self-interest, his relational concerns, and his moral value concerns. I also give the methods to operationalize the study.

Feelings of justice and injustice are experienced commonly in everyday life, which is especially so on the job and in organizations. Organizational behavior studies have consistently shown that how employees experience justice/injustice at work is related to important work outcomes, such as employees' organizational citizenship behavior. A careful review of the literature in this domain, however, shows that examination of antecedents of justice/injustice from the perspective of managers is scant in the current theory and research.

The goal of the current dissertation proposal is to construct a broad conceptual model which will help explain why managers engage in more or less fairness behavior and attitudes toward their employees. The question of "why do some managers behave more fairly than other managers" is a very important research

area because it is the opposite side of the "organizational justice" coin. If the managers do not behave fairly to subordinates, it is nearly impossible that subordinates perceive any justice in their organizations.

Proposal: Robert McNamee, November 24, 2008

Knowledge exchange in organizations: integrating knowledge, creativity, and innovation perspectives

Knowledge, creativity, and innovation have been identified as the main sources of sustainable competitive advantage for firms, yet we have only a limited understanding of how they actually operate at the micro level. To that end, I draw upon four separate literatures (knowledge search-transfer, knowledge sharing repositories, creative ideation, and innovation acceptance finding) that address different aspects of this phenomenon. To create an integrated model of knowledge exchange, I categorize these four archetypes into a 2 x 2 framework of push (receiver initiated) versus pull (source initiated) knowledge exchanges involving proven knowledge versus creative ideas. In my first study, by measuring these and other dimensions explicitly, I hope to assess the assumptions and boundary conditions of each literature, while at the same time identifying new types of knowledge exchanges that do not fit into the traditional perspectives. Building off of my integrated perspective, I propose a second study to model the micro-processes of knowledge exchange and their effects on the engagement of each party and the perceived usefulness of the exchange. In a third study, I propose to extend this model by incorporating the effects of status differences between the parties engaged in these knowledge exchanges. I plan to test these ideas with an egocentric social network survey of employees in one or more organizations.

Proposal: Jun Li, December 12, 2008

Learning in iron cage: Three essays on the adoption of management innovation

Institutional theorists have generally focused on the role of social and cultural characteristics of the external environment that motivate and facilitate the diffusion of management innovations. However, most have treated innovation as "a discrete phenomenon" and have ignored to examine variability of innovation adoption over time. High degree of flexibility or variability among the innovations necessitates research probe into the "Iron Cage" to depict a more comprehensive and compelling picture of institution and institutionalization. Based on propositions from the behavioral theory of the firm, this dissertation intends to unveil the micro processes that characterize organizational responses to institutional pressures. It is composed of three studies which respectively deal with institutional antecedents, institutional motivation and institutional consequences of the adoption of management innovation over time.

The empirical setting will be studies of the adoption of alternative types of public service delivery (PSD) in the U.S. local governments. Information on service delivery will be obtained from the International City/County Management Association's (ICMA) surveys of local governments' Service Delivery Choices conducted in 1982, 1987, 1992, 1997, 2002, and 2007. The ICMA data will be complemented by the data from the Census of Governments in the same years. This setting is selected because the primary method of implementing New Public Management/Reinventing Government (NPM/RG) movement has been the use of contractual or cooperative agreements between local governments and private sector businesses or nonprofit organizations for delivery of public services. Whereas the outsourcing of government services has its advocates and critics, this study posits that accompanying the NPM movement has been an institutional change from traditional to market-driven public management, and perhaps back to traditional for some services over time.

By exploring the "black box" inside of institution, and organizations' response to institutional change over time, the study hopes to make several contributions. First, rather than assuming a simple image of fledging mono-institution, this research will demonstrate interdependence of the old and new institutional logics during institutional change. Second, it intends to depict how organizational heterogeneity is generated through path dependence, even in responding to the same institutional change. Third, it helps provide a more dynamic process of institutionalization instead of an abstract static state of isomorphism suggested by many institutionalists.

Proposal: Emilio De Lia, March 4, 2009

Divergence, convergence and emergence: How diversity, collaborative learning and complexity leadership combine to increase innovation

Because of the increasing knowledge complexity required to innovate in industrial companies, diversity on innovation teams is increasing, however diversity has shown to have both positive effects, such

as increased group creativity and learning, and negative effects, such as more conflict and less collaboration on teams. This research examines how leadership and group dynamics in research and development (R&D) teams affect how diversity impacts innovation. Innovation teams must sustain both divergence and convergence in their dynamics and through team leadership in order to realize innovative emergence, that is, the creation of non-linear outcomes. In this research, the effects on innovation of three types of diversity are considered: demographic, information and thought. Collaborative learning is relevant to understand how teams enhance rather than diminish the value of their differences and describes a team dynamic which supports both creativity and productive conflict and both diversity and integration. In leadership, complexity leadership, a new form of leadership theorized to increase organizational learning, innovation and adaptability by enabling divergence and convergence among members, is tested for its impacts and these impacts are compared to previously researched types of leadership. This study uses multi-method research and combines both qualitative and quantitative analyses of data gathered from members, leaders and stakeholders of existing or recently concluded R&D innovation teams in industrial companies.

DEPARTMENT OF MANAGEMENT SCIENCE & INFORMATION SYSTEMS

Information Technology

1. Tatsiana Levina, February 27, 2004

Using the aggregating algorithm for portfolio selection

This dissertation studies new strategies for selecting portfolios in the stock market. These strategies are inspired by two streams of previous work: (1) work on universalization of strategies for portfolio selection, which began with Thomas Cover's work on constant rebalanced portfolios, published in 1991, and (2) more general work on universalization of online algorithms, especially Vladimir Vovk's work on his aggregating algorithm and his recent work on Markov switching strategies. Vovk's idea of a Markov switching strategy has not heretofore been applied to portfolio selection. We do so, using some simple Markov models. We will explore the mathematical and empirical behavior of the resulting strategies for portfolio selection, as well as their computational implementation.

2. Li Qin, April 18, 2005

Change detection and management for the semantic web

Today, the World Wide Web has become one of the major sources of information and services. It is decentralized, constantly changing in its structure and contents, and gigantic with unchecked growth. However, the full potential of the current web remains untapped because the information on the web is rendered solely for human consumption. In recent years, the notion of the Semantic Web has been introduced to define a machine-interpretable web targeted for automation, integration and reuse of data across different applications. Data instances on the Semantic Web are enriched with metadata, defined as concepts and properties in ontologies, which are formal, explicit specifications of shared conceptualizations of a given domain of discourse.

Detecting changes to data objects has become essential for data warehousing and knowledge archival applications, and search engines. The Semantic Web raises a number of research challenges in the area of change detection and management of data instances and ontologies. By presenting the underlying data semantics, ontologies empower automated inference over ontologies, data instances as well as their changes. This dissertation makes the following research contributions.

First, this dissertation proposes an ontology-guided methodology for detecting changes to data instances. It relies on the fact that changes to certain data instances infer changes to other semantically related data instances.

Second, inferring changes of data instances from others may pose a threat to the confidentiality since ontologies enable the inference of sensitive information from unclassified information. Therefore, one must take into account the inference relationships and carefully assign the access permissions. By considering various inference patterns, this dissertation proposes an access control model that enables elimination of undesired inference.

Third, this dissertation develops methodologies to detecting semantic changes to ontologies. It proposes the notion of isosems to identify the partitions that carry uniform semantics, which is then

employed to analyze how semantic changes to one concept imply semantic changes to other semantically related concepts.

Fourth, changes to an ontology may invalidate its data instances and dependent ontologies. This dissertation proposes approaches to evaluate the validity of data instances and dependent ontologies.

3. Mahmoud Youssef Mohamed, April 21, 2005

Semantically enhanced and efficient location services for preserving mobile consumers privacy

In Mobile Commerce applications, such as location-based advertising, merchants use consumers information to send them personalized advertisements. These applications provide convenience to consumers and competitive advantage to merchants. However, the improper use of consumers information presents a serious threat to their privacy.

The problem environment for this research is the context of a Location Service (LS) that maintains the two types of information used for personalization: consumer profiles and location information.

First, we provide support for the choice of the LS to maintain this information and for the rationale for the consumer to trust it for their information. Then, we address three problems in that environment: 1) How to build a system for enforcing mobile consumers privacy preferences that supports granular representation and spatio-temporal constraints, 2) How to extend that system to support semantically enhanced privacy preferences, and 3) How to improve the efficiency of data management at the LS.

We propose a solution for the first problem that includes an access control model for moving objects and consumer profiles, and a mechanism that enforces spatio-temporal policies. The mechanism includes a new data structure referred to as the Adaptive Search Multi-way trie (ASM-trie). Our evaluation study shows that the ASM-trie has a positive impact on the efficiency of the enforcement mechanism. We then extend that work by employing semantic representation and reasoning. We consider the domain of promotions as an illustrative example. We show how to model consumer preferences and merchant promotions in an ontology using semantic web language and how to enforce these preferences by matching them to merchant queries using reasoning techniques.

In addressing the last problem, we present a unified indexing scheme that improves query performance by partitioning consumer information into clusters and mapping each cluster to a moving objects tree that represent the location information of the consumers in that cluster. The indexing scheme answers queries using a new classification approach with selectable accuracy.

4. Dong-Ho Kim, April 2005

A learning-based model in clickstream-based collaborative filtering

Clickstream-based Collaborative Filtering (CCF) is an area that has been well studied in research and widely adopted in industry due to its scalability. The commonly used prediction models for CCF are the Markov model, sequential association rule, association rule, and clustering. These models have shown varying performance depending on the data set used and/or the parameters such as number of pages (or items) in recommendation, window size, minimum confidence and support. In order to increase recommendation effectiveness by addressing the trade-off relationship between precision and recall, some studies have combined two or more different models or applied multi-order models. The increase of recommendation effectiveness by these models, however, is at best marginal in that they mainly focus on precision and there is room for improving recall because of their first order (one model type) application. To increase recall while minimizing the loss of precision and therefore to increase overall performance, measured by the F value, we build a sequentially applied model (SAM) applying the individual models in an order determined through a learning process. We evaluate SAM over the individual models with both an objective measure and a subjective measure. For the objective measure, we tested with the log data of several sites and it shows that SAM excels in the performance of recall and the F measure over the individual models while its precision is comparable to the highest precision from the models.

With the individual models and SAM, we also propose a novel model integration scheme (MIS) where a user selectively chooses a model, either an individual model or SAM, based on the user's utility function. The scheme MIS is open to any current and future optimized individual models such that they can be readily plugged into the scheme. The scheme is embodied into lookup tables in batch for efficient real-time recommendation.

5. Francis A. Méndez-Mediavilla, July 26, 2005

Using discrete multivariate MCMC Bayesian methods for change detection and disclosure control

In this study we present a Bayesian statistical technique to detect change in the probability distributions underlying materialized views in statistical information systems. The main idea is to improve the performance of aggregate materialized views by reducing the length of the update window. By means of a Monte Carlo simulation we demonstrate: 1) that we can reproduce a detailed aggregate view from a higher level aggregate, achieving data reduction; 2) that we can provide the end-user with posterior distributions for the distance measures; and 3) that we can detect *structural changes* in the *base data*, using distance measures. The setup we present is meant to improve the performance of aggregate materialized views by providing approximate query answers. We demonstrate: 1) that we can provide the end-user with point estimates to support decision making and business intelligence; and 2) that we can provide the end-user with posterior distributions and posterior confidence intervals for each elementary cell in the hypercube, to support decision-making and business intelligence. We demonstrate that we can improve the performance of dynamic view management systems, *DynaMat*, as proposed by Kotidis and Roussopoulos (2001).

6. Ahmed A. Gomaa, April 26, 2006

Dynamic manifestation of composite multimedia objects to achieve multimedia universal access

Information services that offer specialized value added multimedia information in fields such as online media are becoming a common place. On the one hand, for providing richer content, these services first fetch different multimedia components, such as text, images, videos and audios, from various sources, and carefully compose them together into one object, by specifying a set of constraints such as temporal (e.g., video in sync with audio), spatial (e.g., image above text), security (e.g., only subscribers can view the video), and fidelity (e.g., x-ray images are presented on high resolution monitors only). That object is presented to the user, and referred to as *Composite Multimedia Object* (*cmo*). On the other hand, different users have different Capabilities (e.g., languages), Characteristics (e.g., devices) and Credentials (e.g., subscriptions) (*3Cs*).

"Multimedia Universal Access" enables a user to access his/her personalized *cmo* at anytime, anywhere. To create such *cmo* to suit the different users' *3Cs*, there will be an exponential number of possible resulting *cmo* depending on the number of users' *3Cs*. The challenge exists in how to make objects intelligent enough so that they automatically manifest themselves to cater to different users' *3Cs*.

This dissertation addresses two research issues 1) developing a model that presents the different *cmo* constraints and the user *3Cs* in one uniform model such that it lends its self for automatic adaptation, then manifesting the adapted *cmo* to different users, in such as way, that helps automatically identifying and resolving potential mismatches between the *cmo* constraints and user *3Cs*, and 2) integrating the user interaction into the model and identifying and resolving potential deadlocks before the manifestation process.

We develop a new formal model, named Multimedia Color Time Petri net (MMCTPN) within a framework to achieve the Multimedia Universal Access. We then augment the MMCTPN model to include user interaction within the *cmo*. We implement the *cmo* using the Synchronized Multimedia Integration Language (SMIL). We present the user security policy and the user credentials using the Security Assertion Markup Language (SAML).

We present an adaptive *cmo* prototype developed for an emergency management system for the Port Authority of New York and New Jersey.

7. Janice Warner, April 18, 2007

Secure resource sharing in dynamic ad-hoc collaborations

Due to the proliferation of the Internet and web based technologies, coalitions among organizations are increasingly short-lived and dynamic. They are, therefore, formed in an ad-hoc manner to serve a specific purpose using open environments that include web-services, grid computing and ubiquitous computing. In order for multiple organizations to share resources and execute collaborative processes in these coalition environments, efficient and secure solutions are needed to form and maintain the electronic collaborations. The objective of this dissertation research is to define methodologies to facilitate secure sharing in a dynamic coalition in an automatic manner. To this end, we make the following three research contributions:

First, we have proposed a suitable access control model for dynamic ad-hoc coalitions. Secure sharing of resources requires that organizations be able to exercise fine-grained access control over the shared resources governed by their own local security policies. Although this may be accomplished by means of traditional access control and authentication mechanisms, they are difficult to administer when the partnerships and interactions are short-lived and constantly changing. This is because, using traditional access control would require explicit specification of authorizations for individual users within each member organization and changes would need to be painstakingly administered. Our approach automatically translates system level access control policies into implementation level policies using both centralized and distributed models. To facilitate the translation, we also introduce a process for deriving credential requirements that can be applied to unknown individuals who can prove that they are members of a coalition organization. This novel process uses semantics associated with the attributes of users and the resources for which they have permissions.

Secondly, we have advanced approaches for automatically discovering collaborative security policies from existing access control data. In particular, our approach attempts to translate local access control policies into a common role-based access control (RBAC) policy because RBAC is perceived to be policy neutral. It also does not require policies to be set on individual subjects for the coalition, an invaluable feature for coalitions that frequently change. Our policy mining approach builds from role mining, a technique to discover inherent roles from access control data by grouping permissions that are typically assigned to the same set of users.

Third, we have promoted approaches for securely executing processes that span organizational boundaries. In particular, our authorization and task assignment methodology allows individuals to be assigned to tasks taking into consideration separation of duty constraints, delegation and dependencies among the different steps of the process. In addition, we also considered context such as time and place as well as process history.

Forming coalitions is critical in many situations. Disparate groups need to cooperate in emergencies and disaster management. Military organizations need to form coalitions to support peacekeeping and humanitarian operations. Even businesses form coalitions for common business processes such as supply chains or joint marketing campaigns. The contribution of this dissertation is to ensure that electronic sharing of resources in support of the coalitions is done securely.

8. Vandana Janeja, April 24, 2007

Anomaly detection in heterogeneous datasets

Anomaly detection is a data mining technique, which deals with discovering non-trivial and intriguing knowledge, in the form of unusual patterns, objects and relationships. Such a discovery works on the principle of identifying anomalies with respect to the similarly behaving partitions in the data. In this dissertation, we argue that we need to account for heterogeneity within the data in creating these partitions to accurately identify anomalies. In particular, we propose novel approaches to identify anomalous *(a) windows, (b) individual objects and (c) relationships among such objects* in spatio-temporal and traditional data. We have demonstrated that accounting of heterogeneity leads to significant improvement in identifying anomalies, by comparing the results of our proposed approaches with those of representative anomaly detection techniques.

First, we have proposed a random walk-based, Free-Form Spatial Scan Statistic approach, called FS^3, to identify natural, free-form *anomalous windows*. A window is the contiguous part of a region comprising of the objects in it. An anomalous window is unusual compared to the rest of the windows in the region in terms of a specific event of interest. FS^3 eliminates the limitations of existing approaches by identifying windows that are not restricted to a predefined (e.g. circular, rectangular) shape. Our results have indicated that FS^3 identifies more refined anomalous windows in terms of better likelihood ratio of it being an anomaly than those identified by earlier spatial scan statistic approaches.

While FS^3 effectively identifies anomalous windows in terms of an event of interest throughout a region, it may not identify individual spatial objects that are outliers with respect to a group of similarly behaving objects forming a neighborhood. In this dissertation, we have proposed a spatial outlier detection approach to detect *individual anomalous objects* by taking into account both auto-correlation and spatial heterogeneity, whereas existing approaches consider only auto-correlation. Another distinguishing feature of our approach is that, it is order invariant in neighborhood creation. Additionally, we have developed an approach to identify spatio-temporally coalesced outliers comprising of outliers separated by a small time lag, to capture an anomaly traversing through the region. Experimental results in sensor datasets have

demonstrated a significant improvement in neighborhood formation and outlier detection, as compared to existing approaches.

Finally, we have studied the problem of Collusion Set Detection *CSD* to discover *anomalous relationships among objects.* In isolation, individual objects may appear benign, but when considered in relation to each other, they can exhibit interesting behaviors. The goal of *CSD* is to identify a combination of objects that together satisfy a notion of interesting collusive behavior. In this dissertation, we have focused on the specific sub problem of discovering collusive behavior among outlier objects *CSD'*. It considers spatial, temporal and semantic proximities among objects. We have devised a novel collusion distance metric to identify distance based outliers and the causal attributes for the outlying behavior. We have incorporated an ontology-based definition from multiple heterogeneous sources for discovering the semantic relationships between the causal attributes. We have demonstrated that *CSD'* improves both precision and recall, as compared to the traditional approach of Euclidean distance-based outlier detection. It also has reduced significantly the cost of identifying the collusion sets since we do not use the full attribute set but only the causal attributes to identify the collusions between the outlier objects.

9. Aabhas Paliwal, April 27, 2007

Semantic based discovery of web services and orchestration of web service process

Web Service Processes facilitate the integration of applications through reuse of standardized components and interfaces i.e., Web Services. Semantic based Web Services try to provide the next level of integration by supporting automation of the important sub tasks of discovery and composition, within a service-oriented architecture. In this research we consider that a) the vast majority of Web Services that do not have explicitly associated semantics and b) there is a tradeoff between intuitive and easy to understand process representation and consolidated formal mathematical specification for service orchestration. We address two key issues 1) Web Service discovery given non-explicit service description semantics and 2) Web Service orchestration methodology to support composition that is easy to understand, formally sound and does not require extensive formal modeling on the part of the user?

We propose that non-explicit service description semantics can facilitate discovery and this research sets out to prove that hypothesis. We propose a solution to the first issue, of semantic based Web Service discovery, by providing support for functional level service categorization, which utilizes a combination of heterogeneous service description and hierarchical clustering for accurately classifying the relevant Web Service meeting the service requestors' functionality. Next, we conduct a semantic based service discovery on Web Services that combines semantic and confidence coefficient statistical metrics. Semantic metrics are based on the semantic aspects of relevant ontology. Statistical metrics are based on the association aspects of Web Services instances. These associations combined with the semantic relevance are then leveraged to discover and rank Web Services. The ranking of the Web Services is followed by Web Service request expansion, which combines ontology linking and Latent Semantic Indexing, to state the additional terms that are deemed to be relevant for the requested functionality. In addressing the second problem we specify a methodology for precise and coherent specification at a process level and goal reachability analysis, based on policy constraints, at the service level. This method encompasses Web Service Process specification and goal reachability analysis, comprising of service composition using Message Sequence Charts and Colored Petri Nets.

10. Su Kong, September 7, 2007

Agile software development methodology: Effects on software quality and the cultural context for organizational adoption

Despite success stories of using the agile methodology to develop information systems, there are still questions concerning its suitability as well as its impacts on software quality, which have hindered its widespread adoption in the software industry. This dissertation empirically investigates: (a) how systems developers use agile methodologies, and how a developers use of the agile approach is associated with his/her perceived improvement of software quality; (b) why organizations use agile methodologies to differing degrees and whether organizational culture impacts on or explains this disparity.

Since the agile methodology suggests a set of values and behavioral rules to developers, we hypothesized that developers use of agile methodology was directly associated with their perceived benefits of agile methodology to internal performance, while indirectly associated with their perceived benefits to software quality. In order to test these hypotheses, we collected 57 survey responses from software

professionals and analyzed them by Partial Least Squares (PLS). The results of the analysis provided support to all hypothesized associations.

After the survey, we conducted two qualitative studies to investigate the impacts of organizational culture on the organizational adoption of the agile methodology. Using interviews, observations, and document analysis, we searched for cultural assumptions, values, and beliefs, as well as the adoption of agile methodology in two organizations. The data provided strong support to our speculation that organizational culture affects the organizational adoption of agile methodology. In particular, a culture that emphasizes agility and external adaptability facilitates the extensive adoption of the agile methodology in organizations, while a culture of regulations and operational excellence hinders its organizational adoption.

This dissertation contributes to a better understanding of the agile methodology and its adoption and use by developers and organizations. It informs practitioners on when and where to adopt the agile methodology, given their organizational contexts and project characteristics.

Proposal: Qi Guo, October 3, 2007

A formal approach to the role mining problem

Roles, which are nothing but sets of permissions when semantics are unavailable, represent organizational agents that perform certain job functions within the organization. Role-based access control (RBAC) has become the norm for enforcing security since it has been successfully implemented in various commercial systems. Role engineering, the process of defining a set of roles and associate permissions to them, is essential before all the benefits of RBAC can be realized.

There are two basic approaches towards role engineering: top-down and bottom-up. The key problem with the top-down approach is that it is likely to ignore the existing permissions. In addition, the top-down approach calls for the understanding among various authorities from different disciplines, which makes role engineering tedious, time consuming and very difficult to implement. In contrast, the bottom-up approach automates the role engineering process especially when business semantics are not available. Also, it starts from the existing permissions and aggregates them into roles. Therefore, role engineering by the bottom-up approach is also referred to as role mining.

The objective of this dissertation is two-fold: First, it formally defines a suite of role mining problems which will include but not be limited to basic-RMP, edge-RMP and mix-RMP. For each problem, we also consider its different variations which we feel have strong pragmatic significance. In details, we will explore the -approx basic-RMP and the MinNoise basic- RMP which are variants of basic-RMP, the -approx edge-RMP, and the MinNoise edge-RMP as the variants of edge-RMP. We will also discuss the variants of mix-RMP, i.e. the -approx mix-RMP and the MinNoise mix-RMP. More importantly, each of those problems provides an objective which is both good/meaningful and in the view of the entire collection of roles in contrast to only a single one. A good objective associated with each role mining is important since without it and consequently a clear end goal, role mining would be aimless and mining approaches would become incomparable. Also, meaningful and diverse objectives for different role mining problems can help security administrators to meet various organizational needs in process of role generation. It is true that there exist many solutions for role mining so far, unfortunately, none of previous works formally introduces objective functions (even from the perspective of one single role) into role mining paradigm as far as we know. In addition to the formal definitions, for each problem in the suite, we will in-depth investigate other important issues such as its computational complexity, implementation and evaluation of either exact or heuristic solutions or both. We introduce the concept of metrics, the ways of quantitative assessment when we evaluate how good existing approaches to role mining problems are. (i.e. how close the proposed approaches are to the optimality).

Second, it attempts to analyze the role mining problem from a novel perspective, it formulates the role mining problem as nothing but a binary matrix decomposition problem. Therefore, for a specific UPA, different role mining problems are actually the different decompositions of same binary matrix with each of them being associated with a different decomposition criterion. Actually we believe we are the first to model the role mining problem this way. One significant advantage of this modeling is that it naturally prevents the proposed solutions from suffering a serious drawback, that is, a permission can only associate with no more than one role.

Proposal: Heechang Shin, November 19, 2008

Security and privacy in personalized mobile service environments

Services in a mobile environment are based on the locations of mobile users. Personalization, based on the profiles of mobile users, significantly increases the value of such services. However, they pose significant security and privacy challenges; Ensuring security and privacy for a personalized mobile environment in an efficient manner is the primary objective of this dissertation. To this end, we will address the following research issues. Often, access control requirements in a mobile environment are based on the spatio-temporal attributes of mobile users, resources to be protected, profiles of users, or all of these. Evaluating an access request requires searching for the desired moving objects that satisfy the query as well as identifying and enforcing the relevant security policies. Enforcing these access control policies incurs significantly more overhead than that in a traditional environment as the security policies need to be searched based on space and time rather than the user or object identifiers. It has become the norm to index spatio-temporal objects for improving the query performance. Employing similar index structures for security policies may result in efficient enforcement. Instead of having a separate index for mobile objects, security policies and profiles, this dissertation will develop a unified index structure capable of indexing all three in a single index. We plan to conduct a comprehensive experimental evaluation to examine its scalability and performance.

Another pressing issue in delivering mobile services is protecting the privacy of users. The concept of location *k*-anonymity has been advanced to address mobile user privacy. However, it is not sufficient to comprehensively protect privacy in the personalized mobile service environment due to the additional background knowledge such as profile and movement information that can be exploited by the adversary. In this dissertation, we will also propose a more comprehensive family of anonymity models that incorporate location, direction, as well as profile information. We will propose algorithms that can constrain both the generalization of the location as well as that of profiles, while meeting the quality of service requirements. In addition, ensuring such anonymity can limit tracking of the service requestor while continuously receiving a service.

Proposal: Xiaoyun He. December 1, 2008

Privacy-preserving analysis of graph-structured data

In the real world, graph-structured data is ubiquitous. For example, social networks, the World Wide Web, communication networks, transportation networks, etc. can all be modeled as graphs. Many concepts and theories have been proposed to deepen the understanding of the graph data and be used to solve many problems of practical interest represented by graphs. However, little of this work takes privacy concerns into account. The objective of this dissertation is to investigate the problem of preserving the privacy of graph structured data while enabling useful analysis. To this end, we will address the following research issues.

First, we will investigate the Privacy Preserving Link Discovery problem. Link discovery is the process of identifying association(s) among different entities included in a complex network structure. The need for link discovery arises in many applications including law enforcement, counter-terrorism, social network analysis, intrusion detection, and fraud detection. Given the sensitive nature of information that can be revealed from link discovery, privacy is a major concern from the perspective of both individuals and organizations. We propose privacy-preserving solutions to the link discovery problem. While link discovery is quite useful, for applications such as financial fraud or terrorist detection, it may be necessary to figure out if certain entities are related by transactions having certain properties. To this end, we investigate more complex problems such as figuring out the maximum flow between entities across transactions. We propose to adapt the known solutions for the maximum flow problem to ensure no privacy loss. Another important problem with centralized graphs is the question of how to effectively anonymize them. This is especially important in the domain of social networks, where subgraph structure could be used to breach individual privacy. We propose to create effective anonymization techniques that preserve overall graph privacy (including node distribution, structure, and edge labeling) while preserving the overall properties of the original graph.

Proposal: Wenjun Zhou, March 11, 2009

Correlation Computing in Dynamic and Complex Data Types

Correlation computing refers to the problem of efficiently finding groups of strongly-related data objects in very large databases. Most previous studies have been focused on static data sets. However, in real-world applications, input data are often dynamic and must continually be updated. With such large and

growing data sets, new research efforts are expected to develop an incremental solution for correlation computing. Along this line, we propose a CHECK-POINT algorithm that can efficiently incorporate new transactions for correlation computing as they become available. Specifically, we set a checkpoint to establish a computation buffer, which can help us determine an upper bound for the correlation. This checkpoint bound can be exploited to identify a list of candidate pairs, which will be maintained and computed for correlations as new transactions are added into the database. However, if the total number of new transactions is beyond the buffer size, a new upper bound is computed by the new checkpoint and a new list of candidate pairs is identified. Experimental results on real-world data sets show that CHECK-POINT can significantly reduce the correlation computing cost in dynamic data sets and has the advantage of compacting the use of memory space.

In this dissertation, we also propose to deal with correlation computing in data with complex data types. There are several research issues to be addressed. First, it is necessary to have new definitions of correlation patterns, such as local association and clique-type association types, for multi-level and multi-scale data. Second, it is interesting to develop methods for measuring associations among complex data, such as sequences and graphs. Towards this direction, we propose to design a direction-based correlation computing framework which can be applicable for characterizing and understanding the general movement patterns and detect outliers in location traces.

Management Science

11. Miguel A. Lejeune, March 29, 2004

A methodology for probabilistic inventory-production-distribution problems

We consider a supply chain operating in an uncertain environment. Our objective is to construct a robust inventory-production-distribution plan over a multi-period planning horizon. Each supply chain entity deals with a discretely distributed stochastic demand, and cannot backlog the unsatisfied demand. A probabilistic programming methodology is adopted.

The plan minimizes the costs of the supply chain, while enabling it to reach a prescribed service level. It is a strategic plan that hedges against undesirable outcomes, and that can be adjusted to account for possible favorable realizations of uncertain quantities.

For each service level considered, a modular, integrated, and computationally tractable solving methodology is proposed. The methodologies are validated on an industrial problem faced by a chemical supply chain; they allow the finding of efficient solutions with minimal optimality gaps, and result in substantial cost savings.

The model associated with the non-stockout service level contains joint probabilistic constraints enforcing the probability of the joint fulfillment of a system of linear inequalities with dependent random right-hand side variables to be above a prescribed probability level.

In the first module of the methodology, the concept of p-efficiency is shown to be useful for approximating the joint probabilistic constraints. Its application to a stochastic supply chain involves the construction of p -efficient demand trajectories. We complement this concept by designing preprocessing methods that drastically reduce the number of considered demand trajectories.

The second module is devoted to the construction of valid inequalities, used to support the branch-and-bound algorithm. In particular, a new family of cover inequalities for binary-integer knapsack-constraints is developed, allowing finding of substantially better integer solutions.

The third module finds the best p -efficient demand trajectory. A congestion-relief column generation algorithm is implemented, limiting inefficiencies due to bottleneck of distribution resources.

The model associated with the fill rate service level contains normalized expected shortfall constraints. The solving methodology involves the identification of the critical fill rate supply path. It is also shown that the non-stockout cycle service level is more demanding than the fill rate one.

12. Ulas Akkucuk, August 26, 2004

Nonlinear mapping: approaches based on optimizing an index of continuity and applying classical metric MDS on revised distances

Dimensionality reduction techniques are used for representing higher dimensional data by a more meaningful lower dimensional structure. In this paper we will study two such approaches, namely Carroll's Parametric Mapping (abbreviated PARAMAP) (Shepard & Carroll, 1966) and ISOMAP (Tenenbaum, de

Silva, & Langford, 2000). The former relies on iterative minimization of a cost function while the latter applies classical MDS after a preprocessing step involving the use of a shortest path algorithm to define approximate geodesic distances. We will develop a measure of congruence based on preservation of local structure between the input data and the mapped low dimensional embedding, and compare the different approaches on various sets of data with and without error and irregular spacing of points. We will also improve PARAMAP to deal with a larger number of data points by devising a method to split the data into a landmark and a holdout sample, and then extrapolate the holdout points from the landmark configuration. The former will be accomplished by using a procedure intended to find an initial seed for the K-means procedure (DeSarbo, Carroll, Clark, & Green, 1984) and the latter by applying PARAMAP to map in the holdout points into the lower dimensional landmark configuration. We will finally demonstrate a practical application of PARAMAP to musical key intercorrelations data (Krumhansl & Kessler, 1982), also compare the performance of PARAMAP to those of other dimensionality reduction routines applied on the same data (PCA, metric MDS, nonmetric MDS).

13. Jennifer J. Edmonds, September 14, 2004

The evaluation of multiple stage adaptive test designs

Traditional paper and pencil (P&P) tests are linear tests and the same questions are asked of every examinee during an administration. In computer adaptive testing (CAT), examinees receive items that match their current ability estimate. The last decade has seen paper-and-pencil (P&P) tests being replaced by computerized adaptive tests (CATs) within many testing programs. A multi-stage computer adaptive test (MST) combines characteristics of both a standard CAT and P&P test because it adapts to the ability of the examinee like CAT and provides P&P benefits such as test specialist review, exposure of pre-selected items and parallel test forms.

This dissertation evaluated several MST designs under the criteria of (a) scoring reliability to provide accurate scores, (b) simplicity of the design to facilitate review, and (c) efficiency of item pool usage to reduce the cost of test development. The dissertation presented models for constrained MST assembly and gives a computational study on solving the resulting problems. MST assembly models for both discrete and set-based question types have been considered. The dissertation used a commercially available code, CPLEX (ILOG, 2002), as the tool to obtain solutions to mixed integer programming problems arising from the assembly models. The mixed integer programming assembly models were written in AMPL, a modeling language for mathematical programming. Analytical techniques were developed to evaluate scoring accuracy using Item Response Theory (IRT).

The MST approach is being considered as a possible CAT implementation of the Law School Admission Test (LSAT). The final decision on the design choice rests with management and will be based on the objectives of the organization. Summary results necessary for management to make their decisions have been tabulated.

Proposal: Sungyong Choi, May 25, 2007

Risk-averse newsvendor models with law invariant coherent measures of risk

The classical newsvendor problem is a stochastic inventory replenishment problem with random demand and the optimal ordering amount is given as a fraction of demand distribution function. Due to its simplicity and versatility, many variants of the classical problem have been studied. However, much less attention has been paid to the effect of risk aversion in more general setting of newsvendor problem.

In this proposal, we follow the two compatible approaches: stochastic dominance and mean-risk analysis to model choices among uncertain prospects and introduce law-invariance and coherence as the core characters for ideal measures of risk to implement axioms of risk-averse preference. Under these methodologies, we construct risk-averse newsvendor models in various problem settings as follows:

(1) single-stage and single-product risk-averse newsvendor model
(2) multi-stage and single-product risk-averse newsvendor model
(3) single-stage and multi-product risk-averse newsvendor model

In addition, we present the effects of risk aversion for the first two models. Firstly, in the single-stage and single-product model, big ordering amounts can give a chance of getting more revenue, but also higher risk of being left as salvage items. Under this trade-off relationship, the former effect is dominated by the latter and a risk-averse newsvendor always prefers less ordering amount, consequently. Next, in the multi-stage and single-product model, the optimal policy is myopic and stationary and long time horizon gives

more time to sell the product without increasing risk too much. Thus, the newsvendor always chooses to accumulate high target inventory during early stages. We formulate how they work in the newsvendor models and prove them for all law-invariant coherent measures of risk. Our theoretical results are confirmed by the numerical results for sample-based optimization.

DEPARTMENT OF SUPPLY CHAIN MANAGEMENT & MARKETING SCIENCES[1]

Supply Chain Management

1. Hua Zhong, March 31, 2006

Models and algorithms for supply chain network with bi-directional flows

This dissertation was motivated by several operational scheduling problems encountered in real life distribution networks with bi-directional flows, where the forward flow sends new supplies to meet the customer demand while the reverse flow brings back the used ones. The operational performance of such networks depends, to a great extent, the efficiency and the effectiveness of the scheduling algorithms. However, despite an enormous amount of existing literature results, search algorithms for scheduling the operations, especially the integrated production, inventory, and distribution operations, with bi-directional flows are very limited. Analyzing, constructing, and evaluating the new search algorithms for effectively solving the scheduling problems in a bi-directional flow network is therefore the main focus of this research.

The first model focuses on the integrated production and distribution problem with bi-directional flows defined upon a three-stage supply chain network. We propose a partial linear programming relaxation-based heuristic approach to solve a variation of this problem, and derive a theoretical error gap between the optimal solution and the heuristic solution provided by this partial relaxation. We then report the computational performance of the proposed heuristic under various parameter settings. Applications to a medical equipment leasing network that involves a forward flow for new and refurbished devices and a reverse flow for used devices to be returned to suppliers over a multiple time-period planning horizon are discussed.

The second model focuses on the container-vessel scheduling problem involving a forward flow of cargo containers and a reverse flow of empty containers between a foreign origin port and a domestic destination port. The forward order of cargoes for period t must arrive at the destination port no later than t, and the return order of empty containers for period t becomes available at the destination port only at or after t. Each vessel can perform a round trip, departing from and then returning to the origin port, in each time period. We prove that this problem is strongly NP-hard and present three results. First, we show that if all the forward and return orders are integer multiples of vessel load, then the problem is totally unimodular and can be thus solved optimally as a linear program. Second, we show that if every order, either forward or return, is less than a vessel load, then in the optimal solution at most one vessel trip is needed for each time period. Third, we propose a mathematical programming based heuristic algorithm for solving the general problem based on the first two results. Empirical observations on the error gaps by this heuristic are reported.

Our third model extends the work reported in the second model, and focuses on the customer order assignments to the vessels in a bi-directional flow shipping process. We prove the properties of the resulting vessel scheduling problem, show its complexity, and derive the optimality conditions under which the vessel scheduling problem can be decomposed. The results of this analysis then lead to the construction of a fast greedy heuristic vessel scheduling algorithm. Computational performance of the proposed heuristic is presented.

Several major extensions of this research are discussed.

2. Bin Zhou, March 9, 2007

On optimal pricing and ordering in supply chain management

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[1] This department was created in Fall 2008. Before that, the supply chain major was housed in the Department of Management Science and Information Systems, and the marketing major existed only on an individualized basis.

We study new pricing and inventory models that are motivated by several operational problems encountered in real life situations in the fields of dynamic pricing and inventory management in Supply Chains. We propose methodologies for solving these problems by contributing both optimal and heuristic policies and we report the effectiveness of these methodologies. The thesis consists of three essays, in which the first essay studies a dynamic pricing model, and the last two essays explore inventory management problems with minimum order quantity (MOQ) and minimum free shipping (MFS) option, respectively.

In the first essay, we study a new dynamic pricing/production model in which a product is produced and sold over an infinite cyclic horizon. That is, the infinite planning horizon consists of repeated sales cycles (that represent days, seasons, etc.). The demand in each period of a cycle has a discrete distribution, which is a function of the selling price and of the time period within the cycle. The set of the potential selling prices is finite. Price adjustment is allowed in either direction, i.e., both price markup and markdown are possible. We formulate the problem into a Markovian Decision Processes (MDP) model and we give conditions under which the optimal pricing policy has a simple mark down structure in remaining inventory. Finally, numerical examples are provided where we evaluate the optimal policy under long-run average reward criterion using linear programming.

In the second essay, we consider a retailer who operates a single-product, periodic-review inventory system in an infinite horizon. Demands for the product are i.i.d. random variables and the ordering cost of the retailer is linear. In each time period, the retailer can order either none or at least as much as a minimum order quantity (MOQ) specified by its supplier. Since the optimal inventory policy of such a system is unknown, we study and propose a heuristic policy of simple structure, namely the (s, t) policy. Properties of the policy and an algorithm to compute its optimal parameters are also provided. Through numerical examples, we demonstrate that the (s, t) policy has close-to-optimal performance under reasonable conditions, and it constantly and significantly outperforms the (s, S) policies that are currently used in practice.

In the third essay, we study the problem of stochastic inventory systems with free shipping option. We consider a periodic-review inventory model in which the ordering cost is a linear function of the ordering quantity, and the shipping cost is a fixed constant K, whenever the order size is less than a given quantity – the minimum free shipping (MFS) quantity, and it is zero whenever the order size is equal to or greater than the MFS quantity. Demands in different time periods are independent random variables. We present the optimal inventory control policy and characterize its structural properties for the model in single period. For the multiple-period case, we propose a heuristic policy that has a simple structure. In addition, we conduct numerical studies to gauge the effectiveness of the heuristic policy and provide managerial insights.

3. Chunxing Fan, July 20, 2007

On the collaborative planning and scheduling problems

In this research, we study the models, properties, and solution methodologies for the collaborative planning and scheduling problems.

To compete in today's industry, retailers need to know how to make the pricing policy and how to collaborate more effectively with their suppliers to improve the profitability, ocean carries are eager to understand the gains and benefits from different degree of collaboration among the partners, and manufacturers are working hard to identify the operation schedule that matches the customer demand and supply capacity (resources) in a more cost-effective way. For all, collaborative planning and scheduling offer a great opportunity for the practitioners to achieve additional savings in operating cost and for the academic researchers to discover new and challenge optimization problems. In this study, we aim to analyze and quantify the effect of collaborative planning and scheduling.

Despite an enormous amount of existing literature on optimizing the performance of a single company, the results on collaborative planning and scheduling involves multiple partners are scarce. It is the objective of this study to add new models, analytical results and solution methodologies for collaborative planning and scheduling to the literature.

The main results of this research are included in three sections of this thesis.

The first section analyzes the impact of collaborative channel planning and pricing policies for a business process involving a supplier (or a manufacturer), a buyer (or a retailer), and a third party logistic partner with concave transportation cost functions. The market demand is assumed to be a decreasing convex function of buyer's selling price. Under this assumption, we quantify the improvement on total

supply chain profitability when moving from a non-collaborative environment to a partially collaborative environment, and then to a fully collaborative environment. Our result demonstrates the importance of the transporter's role (either as a collaborative partner or as an independent organization) in this collaboration. We also show that, assuming a strictly convex demand function, the joint annual profit of three partners in a fully collaborative environment can be at least twice of what may be achieved by three independently operated companies in a leader-follower business game.

The second section models and analyzes the operational performance of ocean carriers under three operation policies: the non-collaborative policy, the slot-sharing policy, and the total-sharing (the total collaboration) policy. The *non-collaborative* policy aims at constructing vessel schedules and assigning customer orders to vessels to minimize an individual carrier's operating cost without sharing any resource with external carriers. The *slot-sharing* policy requires a pre-fixed percentage of vessel capacity to be exchanged between the carriers over a given planning horizon. The *total-sharing* policy aims at achieving a full collaboration between two partner carriers by total demand sharing and flexible vessel resource sharing. For each operation policy, we propose a vessel scheduling algorithm that either solves a respective mixed integer programming problem directly or utilizes a mathematical programming based heuristic. Empirical studies based on 2,040 randomly-generated test cases involving several parameter values quoted from real-life shipping industry are conducted. It is our observation that as the partner carriers' willingness to share the demand information and to share the resources in a flexible manner increases, the effectiveness (in terms of the reduction in operating cost) of collaborative vessel scheduling increases.

The third section focuses on the integrated supply-distribution problem involving heterogeneous facilities and multiple customer sites. Each has a period demand over a multiple period planning horizon and a penalty for the shortage. We report and mathematically prove the correctness of three observations on the properties of the problem, and propose a greedy heuristic search algorithm to solve it. This heuristic solves a respective minimal cost flow problem in each time period to form the initial vessel route and finally a linear programming problem for constructing the integrated operation schedules that solves the respective demand-supply scheduling problem. This result addresses a common sub-problem encountered in supply chain practices where customer demand and available business resources (supplies, and manufacturer transportation capacity) must be coordinated.

4. Min Shi, August 3, 2007

Detection of aberrant response patterns in testing using cumulative sum control schemes

The main objective of testing is the effective assessment of a test-taker's *ability* θ, based on a certain test score. However, various causes exist that may invalidate this assessment. For example, examinees may take a test to familiarize themselves with potential questions (commonly referred to as *items*) and may randomly guess the correct answers on many items in the test, or examinees may have pre-knowledge of some questions and may answer them correctly independent of their ability or the item characteristics. These and other aberrant response behaviors may result in invalid test statistics that could lead to errors in calibration and scoring.

Person-fit measurement refers to some statistical methods employed to evaluate the fit of a response pattern to a particular test model. Several person-fit statistics (PFSs) have been proposed in the context of linear tests that can be used to identify score patterns that are not in agreement with the expected response pattern based on an *item response theory* (IRT) model. For an individual test-taker with ability θ, these PFSs are used to statistically assess the size of the residuals of the observed and corresponding expected item scores across all items in a certain IRT model. When the distribution of a person-fit statistic (PFS) in the absence of any aberrant response behavior can be derived or well approximated, item score patterns can be classified as fitting or non-fitting.

Statistical Process Control (SPC) refers to a collection of statistical methods used for monitoring, controlling, and improving the output of a process of interest. In particular, *cumulative sum* (CUSUM) control schemes are highly efficient SPC methods widely used in many areas of manufacturing, business, economics, finance, medicine, and engineering, to ensure that a process of interest performs as designed and intended. Composed of three essays, this dissertation applies CUSUM chart methods to detect aberrant response patterns in the context of standardized tests. The tests we used in the studies were either assembled to meet the specifications of a large-scale testing agency, or were assembled randomly with an approach described in literature.

The first essay investigates the likelihood-based PFS, commonly denoted by l_z and regarded as one of the best PFSs in the literature. However, we found that the detection performance of the l_z statistic was heavily conditional on test characteristics. The simulation results showed that its detection power could severely deteriorate and even become biased (in a hypothesis testing sense) under some specific scenarios. This essay provides an explanation for the potentially poor performance of l_z and summarizes the patterns and conditions for which the l_z statistic should not be recommended for detecting aberrant behavior.

In the second essay, a new class of cumulative sum (CUSUM) PFSs based on recent work of Zachary G. Stoumbos and some of his coauthors was considered for the difficult problem of detecting aberrant behavior in the context of linear tests. Extensive Monte Carlo simulations were conducted to compare the detection rates of this new class of CUSUM schemes with those of selected popular PFSs from the literature. We showed that the new class of CUSUM schemes outperforms all of the selected person-fit statistics, for both the true and estimated ability values θ of a test taker.

The third essay extends the above CUSUM PFS model to model-free person-fit detection, based on the Bayes Rule applied to the total number of correct responses from the test. The detection performance of this model-free person-fit CUSUM was then compared with some standard, model-free PFSs from the literature. It was shown that the model-free person-fit CUSUM scheme uniformly and substantially outperforms all considered standard, model-free person-fit statistics. Moreover, we found that the performance of the new class of CUSUM PFSs is robust across various scenarios of aberrant behavior. That is, the new class of CUSUM PFSs is superior for practical applications to the model-free PFSs that we used in our performance evaluations.

5. Yihong Fan, March 19, 2008

Stochastic models for make-to-stock production-inventory systems

This thesis considers a class of single-stage, single-product Make-to-Stock Production/Inventory Systems (MTS systems) with backorders, under various replenishment policies. It studies two types of stochastic models for such MTS systems: a discrete model and a stochastic fluid model (SFM). In a discrete model of an MTS system, order fulfillment from inventory following demand arrivals and inventory restocking following replenishment arrivals are modeled as discrete jumps in the inventory position level. In contrast, stocks in an SFM are treated as fluid, and demand fulfillment and inventory replenishment are carried out continuously, as stock flows into and out of inventory driven by flow rates. We then proceed to derive formulas for Infinitesimal Perturbation Analysis (IPA) derivatives in such MTS systems, and show them to be unbiased under appropriate conditions.

The choice of a discrete model or SFM for an MTS system is motivated by a fundamental tradeoff, stemming from the tendency of IPA derivatives to have singularities (and bias) in discrete models, while their SFM counterparts often require the estimation of unknown instantaneous rates at specific times. Rate estimation renders the corresponding IPA formulas in SFM versions computationally brittle, whereas their discrete-model counterparts are readily computable from sample path observables. Accordingly, this thesis studies MTS systems with backorders under the   policy using an SFM, and derives IPA derivatives of time averages of inventory levels and backorder levels, both with respect to the stock-up-to level parameter and the reorder-point parameter. The thesis further studies MTS systems with backorders under the base-stock policy using a discrete model, and derives IPA derivatives of time averages of inventory levels and backorder levels, both with respect to the base-stock level parameter and a lead-time parameter; this system was previously studied in Zhao and Melamed (2006) using an SFM. Finally, the thesis simplifies the IPA derivative formulas of the inventory time average and the backorders time average with respect to the base-stock level parameter (previously obtained in Zhao and Melamed (2006)) by adding realistic assumptions that eliminate their brittle terms, thereby obviating the need to estimate instantaneous rates.

6. Ching-Yu Chen, May 20, 2008

Essays on supply chain inventory management

This thesis is composed of two parts. Part I, including Chapters 2-3, develop models that integrate inventory planning with project management in project-driven supply chains. Part II, including Chapter 4, studies multi-echelon inventory models with batch ordering policy and compound Poisson demand.

Project-driven supply chains (PDSCs) are combinations of project activities and their supporting material supply chains where the demand for the latter is driven by the material requirement of the former. In Chapter 2, we present a modeling paradigm to help firms make material supply and project decisions jointly in PDSCs under the guaranteed service-time assumption. We develop an optimization model to determine the optimal inventory levels, activity durations, and project schedule simultaneously, so as to strike a balance between inventory cost and project costs. For tree networks, we present a joint optimization algorithm based on dynamic programming. Using examples, we demonstrate that isolated project planning/scheduling that ignores material supplies can lead to a significant loss, as compared to the joint optimization. Even if the project activities can not be expedited, coordinating the project schedule with inventory decisions alone can result in sizable savings. We also discuss material customization and develop insights on how the savings are generated by the joint optimization, and when they are significant.

In Chapter 3, we relax the guaranteed service-time assumption to allow for stochastic service-times where the material lead times are stochastic. Numerical results suggest that joint planning leads to a substantial reduction on system-wide cost especially when lead times are uncertain.

In Chapter 4, we study multi-echelon tree-structure supply chains where external demand follows compound Poisson process, and each stage employs a continuous-time (R, nQ) policy. It is assumed that transit times are sequential, exogenous and stochastic.

We present an analytical framework to characterize the distribution of inventory level and stockout delay. We propose procedures to approximate the internal demand processes and lead time distributions. A dynamic programming algorithm is developed to search for the optimal reorder points (subject to approximations). A numerical study is conducted to demonstrate the efficiency and accuracy of the approximation procedures.

7. Wen Chen, July 23, 2008

New models and solutions for stochastic optimization for R&D and transportation problems

In this dissertation we develop new models and efficient solution procedures for important stochastic optimization issues in industrial R&D and transportation.

The first model deals with the problem of how a firm can decide to bring into the market a new product either by using internal research (IR) or by purchasing (or licensing) outside existing technology (ET). The product lifetime is a known constant and the IR consists of a known number of stages, where each stage has a random duration with known distribution. Decision epochs correspond to the start of each IR stage. The IR has a known cost per unit time and it can cause a delay to the introduction of the product. The internal research if successful will result to a new product that will have a reward r1 per unit time. On the other hand the ET yields a constant return $r_0 < r_1$ per unit of time the technology ET is adopted. The main results of this chapter are: It is shown that the optimal stopping time for IR is determined by a sequence of : "cut off points for each stage, that at each decision epoch the optimal action can be determined by comparing two values, the optimal "cut-off" points can be computed as the unique solution to provided equations, and they are increasing in the number of remaining stages. Finally, explicit solutions and numerical computations are given for three interesting choices for the stage duration distributions.

With the second model we study an inventory system in which the retailer during each period can further optimize its response to a shortage by either choosing to ignore the excess demand or by selecting one of a fixed number of available express channels to fulfill the excess demand. It is assumed that between periods the retailer employs an (*s*, *S*) policy, where *s* and *S* are given and the objective is to determine a vector $\vec{w} = (n_1, \ldots, n_m)$ such that when the shortage of a period is smaller than n_1 it is ignored, and when the "current" shortage is between n_k and n_{k+1} then the retailer will use express channel *k* to immediately order enough additional items to fulfill the excess demand of the current period. In the case of a Geometric demand distribution we have computed the explicit value of $\vec{w}$ that maximizes the expected average profit for the system.

In the third model we study a container shipping problem in which in every period the demand is random, production is completed at some distant location and shipping is done using containers with a high transportation fee per container. We give a simple D.P. formulation for this general problem and we show that the optimal container shipping policy in each time period is specified by a single number - the minimum shipping quantity. Further, we give solutions for the case of iid uniform demands with a finite horizon as well as for several interesting two period cases with iid demands with Exponential or Gamma distributions.

Proposal: Su Gao, June 17, 2005

Branch & bound search algorithm for the zero-inventory production-distribution problem

In this paper, we propose a branch and bound based search procedure for solving the no-inventory production and distribution problem with a single transporter and a fixed sequence of customers. The production facility has a limited production rate, and the delivery truck has a non-negligible traveling time between locations. The order in which customers may receive deliveries is fixed. Each customer requests a delivery quantity and a time window for receiving the delivery. The lifespan of the product starts as soon as the production for a customer order is completed, which makes the product expire in a constant time. Since the production facility and the shipping truck are limited resources, not all the customers may receive the delivery within their specified time windows and/or within product life span. The problem is then to choose a subset of customers from the given sequence to receive the deliveries to maximize the amount of demand satisfied without violating the product lifetime, the production/distribution capacity, and the delivery time window constraints. We analyze the properties of the problem and show that these properties can lead to a fast branch and bound based solution procedure. A heuristic lower bound on the optimal solution is developed to speed up the search. Empirical observations on the computational effort required by the resulting search procedure comparing to that required by CPLEX on randomly generated test cases are reported.

Proposal: Dinesh R. Pai, December 7, 2007

Determining the efficacy of mathematical programming approaches for multi-group classification

Managers have been grappling with the problem of extracting patterns out of the vast database generated by their systems. The advent of powerful information systems in organizations and the consequent agglomeration of vast pool of data since the mid-1980s have created renewed interest in the usefulness of discriminant analysis (DA). Expert systems have come to the aid of managers in their day-to-day decision making with many successful applications in financial planning, sales management, and other areas of business operations [Erenguc and Koehler. (1990)].
Currently, no comprehensive study exists that tests the robustness of multi-group classification analysis. Our study aims to bridge these gaps and take a step further by extending our study to four-group classification problems. The main purpose of this study is to determine the efficacy of MP classification models, more specifically, a LP method vis-à-vis statistical approaches such as discriminant analysis (Mahalanobis), and logistic regression, and an artificial intelligence (AI) technique such as neural network for four-group classification problems. We also propose a hybrid model that combines an unsupervised classification technique and a MP approach to enhance the overall classification performance. Further, we extend an existing two-group MP model [Bal et al. (2006)] based on the work of [Lam and Moy (1996)] and use it for four-group classification problems. We test these models through robust experimental design using two different examples with large datasets. We use characteristics of a real dataset to simulate multiple sample runs for four group problems with three independent variables.

Proposal: Kartikeya Puranam, April 16, 2008

Optimizing taboo measures of performance in Markov decision processes with applications

The optimization of Markovian Systems often based on costs or rewards associated various states of the system. However in many real life cases it is very difficult to determine the cost or rewards that are associated with each state. In such situations we propose that instead of relying on a cost structure, the emphasis should be on maximizing/minimizing measures that will reduce the tendency of the system to visit ``undesirable states", the so called ``taboo states".

We develop Markovian Decision Models for which optimal policies exist for several interesting taboo measures of system performance. Further, we provide methods for the computation of optimal policies.

We discuss applications of the above ideas in the context of optimal replacement as well as optimal inventory control.

Proposal: Adam Fleischhacker. May 5, 2008

Supply chain planning and the risk of demand failure

As a compromise between the often unrealistic assumption of deterministic demand and the unbearable complexity of fully stochastic obsolescence models, we offer a new assumption that falls in the middle of

these two. This is the assumption of demand failure. Demand failure is defined as the sudden ceasing of a deterministic demand stream. In other words, all future demand from the point of demand failure is zero.

We explore the appropriateness and the impact of incorporating demand failure into supply chain decision making. The study of demand failure improves upon deterministic demand models by incorporating this stochastic component of the demand stream. The study of demand failure improves upon stochastic obsolescence models because it yields cleaner results.

As part of the proposal, we introduce a powerful example demonstrating the value of this demand failure assumption. Specifically, we show that incorporating demand failure into the production planning decision of a clinical trial supply chain leads to a simpler model than would otherwise be used by stochastic obsolescence models. In addition, we show that using this model leads to substantial savings in real world environments. Leveraging the success we have found incorporating demand failure into this production planning decision, we highlight areas where we will continue the investigation of demand failures impact on supply chain decision making.

Proposal: Junmin Shi, May 22, 2008
Assemble-to-order systems, allocation rules and component commonality

Component commonality has been widely recognized as a key factor in achieving product variety at low cost. We study the value of component commonality in continuous-time assemble-to-order (ATO) system with positive lead times and non-holdback (NHB) allocation rules. Under an NHB allocation rule, a product demand is backordered if and only if at least one of its required components is out of stock. We compare the total back orders, total inventory and average inventory cost associated with systems with and without component commonality, and with different degrees of commonality. We first study a two-product system and find that for any given base-stock levels and under any NHB allocation rule, the total backorder and total inventory can be reduced with probability one as the degree of commonality degree increases. The same result holds for more generalized systems. In addition, we have obtained the mean backorder for each individual product in close-form for MFIFO rule (a special case of NHB rule), which allows us to characterize the average cost of the system under this rule.

We propose to continue our research in the following directions: (1) to provide an efficient algorithm to find the optimal base-stock policies under the MFIFO rule; (2) to analyze the performance evaluation under other NHB rules such as priority clearance rule; (3) to study NHB rule in some general systems such as the "M" system and the clustered system; (4) to analyze hold-back rules such as the reservation rules.

Marketing

8. Stephen L. France, September 26, 2008
Developing metric MDS techniques for the visualization and interpretation of customer data

With the growth of customer information systems, there is an increasing amount of customer data available to companies. There is a great need to be able to analyze and interpret these data. An important data analysis tool in the interpretation of data is that of visualization. This dissertation concentrates on one particular visualization technique, that of distance based metric multidimensional scaling (MDS). The dissertation concentrates on the development of metric MDS as a serious tool for visualization and data analysis.

The dissertation consists of four papers. Each paper concentrates on some aspect of the theory or application of distance based metric scaling. The underlying thread across all of these papers is the development of metric MDS as a tool for the analysis of large-scale, real world data sets.

The first paper develops a metric ψ, based upon the RAND index, for the comparison and evaluation of dimensionality reduction techniques. This metric is designed to test the preservation of neighborhood structure in derived lower dimensional configurations and to compare different solution configurations for differences in structure.

The second paper is concerned with the performance of different distance metrics for high dimensional data mining and data analysis. The paper shows both the theoretical and empirical relationships between the cosine, correlation, and Euclidean metrics. The paper proposes that some of the performance difference between the cosine and correlation metrics and the Minkowski-p metrics, previously thought to be because of distance compression, is due to the inbuilt normalization of the cosine and correlation metrics.
In paper three, a method called DEMScale is introduced for large scale MDS. DEMScale can be used to

reduce MDS problems into manageable sub-problems, which are then scaled separately. The DEMScale method is general, and is independent of MDS technique and optimization method.

The forth paper develops an algorithm for modeling competitive market structure from auction data. The algorithm outputs measures of similarity and dissimilarity between products using auction bidding data. The paper shows how this similarity/dissimilarity information can be used to produce visualizations of product competition using MDS.

NJIT DEPARTMENT OF INFORMATION SYSTEMS

Computer Information Systems[2]

1. Mojgan Mohtashami, June 8, 2006

The antecedents and impacts of information processing effectiveness in inter-organizational collaborative software development

The global competition and its demands, coupled with advanced technology and product customization, have made isolated organizations a concept of the past, and thus the need for a new model of organizations that is dynamic, multi-disciplinary and responsive. Organizations must now work collectively to make the most of their resources and expertise, and to improve market accessibility. Success of inter-organizational undertakings is therefore possible through effective and efficient communication, coordination, and collaboration. Adopting such approach will, it is hypothesized here, result in less uncertainty, better streamlining, more accurate forecasting, improved decision-making, and higher quality products. This study addresses the critical role of information flow and communication in general and software development management in particular, and suggests that the information flow is particularly important at the interfaces of organizations where cooperation and collaboration take place.

Collaborative software development (CSD) as one specific form of group collaboration entails inter-organizational alliances, in multiple teams, working for various functional organizations with flexible component boundaries with often no clear central authority. Such software development practices cross national, linguistic, organizational, and cultural boundaries. It too changes and extends the domain and nature of software development management. Management of such uncertain and complex projects demands cross-functional teams and group collaboration, as well as accurate and timely information exchange.

This work employs a multi-disciplinary approach that brings together concepts from the software engineering, organizational behavior, communication and management fields to address the needs and particulars of collaborative software development settings. It systematically defines a framework that identifies and categorizes factors affecting collaboration and communication among organizations. Presented in this dissertation are the details of a two tier study which examines and operationalizes the effect of communication between collaborating agencies (i.e., their information processing capacity, or IPC) as a central construct, one that explains much of the variation in software development performance. The experimental results reveal that the management contingency profile is by far the most important factor in influencing the success of inter-organizational information processing and success of software development performance. Within the dimensions of management profile, employee empowerment and organizational support show the most substantial positive effect on information processing capability. This dimension remains influential when compared directly against the success of software development performance. The study also indicates that cultural familiarity and trust remain among the top four most influential factors in the success of inter-organizational collaboration, and that the standard software development practices may negatively influence some of the constructs under study.

This study makes several contributions to the theoretical and practical aspects of software development. First, a new construct in collaboration, IPC, was defined and operationalized. Then, a model for the impact of IPC on the success of collaborative software development was created and tested using data from companies engaged in software engineering projects. Next, factors with significant influence on IPC and the success of inter-organizational software development were identified, assessed, and prioritized.

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[2] These are the last two dissertations for this major. The NJIT Department of Information Systems now offers its own doctoral degree through NJIT.

Finally, this study, which comprehensively examines interorganizational collaboration, provides a baseline on which further investigation of inter-organizational collaboration can take place.

2. Luyin Zhao, April 10, 2007

Exploratory inspection: A user-based learning model for improving open source software usability

The proliferation of open source software arouses great interest in its unique development model, particularly the specialized contributions from users. Although software usability has been considered as one of the major success factors with traditional software development, the usability aspect of the open source development model has been under-explored.

Results from prior studies on this subject, aside from their limitations in number and in scope, do not favor a positive relationship between the existing open source development model and good usability due to a host of social context reasons. While several methods have been tentatively proposed for improving open source usability, how to get non-expert contributors involved, especially how to transfer usability knowledge to them remains an open question.

This work is concerned with defining and establishing effective methods for opens source software usability improvement. The earlier part of the dissertation reviews usability theories and various evaluation methods. With the belief that transferring usability knowledge to non-expert contributors (i.e. users) is a most difficult problem to solve, a method for combining exploratory learning and usability inspection is then proposed, referred to thereafter as exploratory inspection. The concept of exploratory learning has been used in prior research to train software users through learning-by-doing. Drawing on the similarities between learning a new software system and acquiring related usability knowledge, the exploratory inspection approach is proposed as a plausible means to help usability contributors gain usability knowledge through performing real usability inspection tasks.

This method emphasizes providing structured usability knowledge (i.e. usability patterns) during usability inspection, or a "learning-by-doing" approach. Furthermore, this research also investigates the impact of the strategies of "outlining knowledge" and "exploration freedom" on the outcome of inspection. An experiment involving over 300 OSS users has shown that this method outperforms traditional heuristics-based inspection for non-expert users. The severity of usability problems found, quality of improvement suggestions made, learning motivation and efficiency are all significantly improved using the new method. Results also show that the two strategies improved effectiveness of usability knowledge acquisition as well.