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The *Midwestern Business and Economic Review* invites submission of original manuscripts and research by individuals in the public and private sector in the areas of economics and business administration. Of particular interest are topics dealing with issues relevant to Texas and the Southwestern United States. Submission requirements may be found inside the back cover.

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IFRS AND TEXAS INDUSTRY CLUSTERS: LIKELY INTERSECTIONS

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INTRODUCTION

The state of Texas is home to a strong economy that is diverse in its numerous industries, robust during periods of growth, and more recently, resilient during challenging times. Despite the recent economic downturn, Texas was recognized by CNBC[1] as the top state for business in 2008 and by Chief Executive[2] for 2009. Texas is also home to 56 companies on the Fortune 500 list, six of which rank in the top 50.

In 2004, as part of an economic initiative to create a long-term strategic plan for job creation, Texas' main industries were grouped into six primary clusters: Advanced Technology & Manufacturing; Aerospace & Defense; Biotech & Life Sciences; Information & Computer Technology; Petroleum Refining & Chemical Products; and Energy. In addition to these primary industry sectors, Texas is also the nation's largest exporter of goods such as chemicals, computers and electronic products, machinery, petroleum, and transportation equipment.

Meanwhile, the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB) have begun their initiative to establish a compatible set of accounting standards that could be used within and outside U.S. borders. A plan of convergence was initiated between the United States Generally Accepted Accounting Principles (US GAAP) and the International Financial Reporting Standards (IFRS).

With the onset of IFRS, some of the six industry clusters will feel the effects of the change sooner than others. This article will identify industry clusters that will experience the biggest impact of the convergence with the new standards, outline the effect of these upcoming changes and suggest ways for companies and investors to adapt.

THE ARRIVAL OF IFRS

Overview

In a global economy where companies are branching outside of their home countries to unlock their business' potential, an accounting standard that is universally accepted will make it easier for investors and managers to interpret data derived from financial statements. The IASB aims to create a global convergence of accounting standards in order to achieve better comparability among companies operating in different countries. Companies with foreign subsidiaries that are required to present their financial statements according to the standards set by their country of residence would also benefit. With IFRS implemented across the globe, multinational companies will be able to use one set of accounting standards in their operations, and accounting and finance professionals can move globally without needing to relearn local standards. Lastly, converting to IFRS opens up new ways to raise capital from foreign sources because IFRS assures that financial statements conform to similar requirements.

Because of IASB's efforts, nearly 100 countries now require or allow IFRS and are on their way to convergence. In the United States, the signing of The Norwalk Agreement in 2002 opened the doors for the convergence initiative. The FASB is working closely with the IASB to arrive at an acceptable union of accounting standards for preparers and users of financial statements alike. In addition, the Securities and Exchange Commission (SEC) has issued a proposed roadmap to illustrate the progress towards convergence with IFRS and to set milestones for public companies as they begin the transition. The SEC will begin to mandate that large public companies convert their financials to IFRS no earlier than 2015.

However, as expected with any type of change, there are apprehensions about the conversion. For one, many people acknowledge that US GAAP is the gold standard due to its depth and breadth in covering key accounting issues. Transitioning to IFRS would require that the FASB's role be passed on to the IASB, which some fear would deprive the U.S. of the ability to protect its own interests because its perspectives may not be well-represented. Enforcement of the convergence of GAAP is also foreseen as a regulatory issue since it is carried out by different agencies in every country, including the SEC in the United States. The substantial number and differences in regulatory agencies may pose a challenge in creating globally consistent standards as enforcement may be implemented in varying degrees. Lastly, small public companies that only operate domestically may be hesitant to convert because the costs of adopting IFRS would outweigh the benefits.

Convergence vs. Adoption

The advantage of utilizing the convergence process to create a set of rules that is compatible to both the IASB and FASB is that convergence allows for the alignment of principles and general methods between the two standards. Attempting to look for and eliminate every possible difference between IFRS and US GAAP would be costly and time consuming. Convergence, on the other hand, will make adoption of the new standards easier and less costly, although it may not eliminate all of the differences that exist between IFRS and US GAAP. It is too

early to predict whether or not a full convergence will come to fruition, as certain disagreements that may lead to exceptions in conforming to IFRS are likely to exist.

KEY DIFFERENCES BETWEEN IFRS AND US GAAP

Rule-based vs. Principles-based Accounting

One of the primary differences between US GAAP and IFRS lies in their most fundamental premise. IFRS is identified as a more principles-based system, meaning it relies more on the application of professional judgment and less on rules. A principles-based system is more flexible when encountering unique business or economic circumstances, although skeptics argue that professional judgment encourages bias. On the other hand, US GAAP is a rule-based system that prescribes an applicable rule for every situation. Many accountants in the U.S. have been trained to "consult the books" when encountering uncertainties or unique business scenarios. US GAAP attempts to create a rule for every possible scenario or problem that may be encountered which tends to increase complexity over time as new rules are continuously added. In addition, instances of abusing rule-based US GAAP in recent accounting scandals have motivated standard setters and regulators to consider the viability of a principles-based system such as IFRS. The Sarbanes-Oxley Act of 2002 also called for the study of a principles-based accounting system to weigh its costs and benefits.

Inventory Costing and Valuation

IFRS prohibits the use of the Last In First Out (LIFO) inventory costing method. In addition, IFRS requires that inventory costing methods be applied consistently for all inventories with a similar nature and use. With US GAAP, companies may be able to use different costing methods for similar products in different geographical segments because standards pertaining to consistency have not been addressed.

When valuing inventory, US GAAP requires that the lower of cost or market (replacement cost) be used, where market value cannot exceed net realizable value (NRV) or be less than NRV after a profit margin is subtracted. On the other hand, IFRS does not impose a similar floor or ceiling, but rather requires inventory to be recorded at the lower of cost or NRV. When writing down to lower of cost or market under US GAAP, inventory cannot be written back up for subsequent recoveries of value, whereas IFRS requires such reversals of inventory write-downs upon recovery (only up to the amount of the original write-down).

Revenue Recognition

Both standards recognize revenue when it is both realized (or realizable) and earned. Ultimately, US GAAP and IFRS contain revenue recognition criteria that are highly similar. However, the key difference between both standards lies in the detail and extent of existing guidelines. US GAAP includes an extensive number of standards that are detailed and industry-specific. The detailed rules also contain exceptions for specific types of transactions, and companies are also expected to follow additional guidance from the SEC.

On the other hand, IFRS offers less guidance than US GAAP in terms of revenue recognition, and industry-specific instruction is limited; therefore professional judgment is used to a greater extent. A single standard (IAS 18 - Revenue) contains the basic principles of revenue recognition under IFRS.

Recognizing revenue for construction contracts also poses a few challenges. The scope of construction contracts differs for both standards. Contracts that fall under the scope of Statement of Position 81-1 (Accounting for Performance of Construction-Type and Certain Production-Type Contracts) under US GAAP are not guaranteed to conform to the definition of acceptable contracts under IAS 11 (Construction Contracts) by IFRS. SOP 81-1 applies to construction or production contracts that were drafted based on a buyer's specifications, while IAS 11 only applies to contracts that are "specifically negotiated for the construction of an asset or a combination of assets that are closely interrelated or interdependent in terms of their design, technology, and function or their ultimate purpose or use." In determining whether or not a contract falls under the scope of IAS 11, professional judgment is required. Contracts that are deemed not to fall within the definition of IAS 11 are treated using the broader revenue guidelines of IAS 18.

The available methods for recognizing revenue under construction accounting also differ. US GAAP allows the percentage-of-completion and completed-contract methods. Similarly, IFRS also uses the percentage-of-completion method to account for contracts, but prohibits the completed-contract method. Within the percentage-of-completion model, US GAAP uses two approaches, namely the revenue approach (percentage of revenue less actual costs) and the gross-profit approach, while IFRS only utilizes the former. The gross-profit approach is not allowed under IFRS.

On the topic of combination and segmentation of contracts, US GAAP allows for discretion in the choice as long as certain criteria are met and the election is applied consistently. On the other hand, IFRS requires the combination or segmentation of contracts once an established set of criteria are met and provides no alternatives.

Impairment Testing

While both standards require testing goodwill regularly for impairment, the methods used differ to the extent that variability in timing and extent of recognized impairment losses may exist. Under US GAAP, goodwill is assigned to reporting units and tested for impairment using a two-step approach. First, the fair value and carrying amount of the reporting unit including goodwill are compared. If the fair value of the reporting unit is less than the carrying amount, impairment of goodwill is measured as the excess of the carrying amount of goodwill over its implied fair value. On the other hand, IAS 36 (Impairment of Assets) allocates goodwill to a cash-generating unit (CGU) or a group of CGUs and utilizes the single-step approach in

impairment testing. Under this approach, the carrying amount is compared to the recoverable amount of the CGU or group of CGUs, which is the higher of fair value less costs to sell and the value in use. Impairment losses are then recognized as the excess of the carrying amount over the recoverable amount.

Contingent Liabilities

If an obligation resulting from a past event is deemed probable under US GAAP, an accrual for a loss contingency is required. The term probable used in this context is generally considered to have a 75 percent or greater likelihood of occurrence. However, IAS 37 (Provisions, Contingent Liabilities and Contingent Assets) uses a more likely than not probability threshold in determining whether or not a contingent liability must be recorded. Under these circumstances, a contingent liability is recorded if chances that a loss may occur are greater than 50 percent. Thus, the differences in the interpretation of probability may result in earlier recognition of liabilities under IFRS.

With these changes on the horizon, companies within specific industries should consider the impact of conversion to IFRS on their business. The costs of converting to IFRS include training and implementation, restructuring information technology, and support, among others. A strategic approach to handling the transition will help avoid inefficiencies.

IFRS AND TEXAS – INDUSTRY-SPECIFIC EFFECTS

For Texas' six industry clusters, specific changes are sure to have an effect on their operations—some sooner than others. Three of the six clusters, namely 1) energy, 2) aerospace & defense and 3) biotech & life sciences, include some of Texas' largest industries. Looking at industry-specific differences between US GAAP and IFRS may help companies within these three clusters gauge the effects and plan ahead.

Energy

Industry Overview

As one of Texas' oldest and most diverse industries, the energy cluster possesses a powerful potential for economic growth. It is made up of three sub-clusters: oil and gas exploration and production; electric/coal/nuclear power generation; and renewable and sustainable energy generation. According to the Energy Information Administration, Texas leads the nation in crude oil production and refining, along with natural gas production and reserves. Aside from its strength in oil and gas, Texas is also the nation's leader in renewable energy and wind energy production; four of the nation's largest wind projects are in Texas.

Key Issues

Under US GAAP, exploration and production activities are accounted for using either the full cost or successful efforts method of accounting. The full cost method is governed by SEC Regulation S-X Rule 4-10, while the successful efforts method falls under ASC 932-360-25-2 (formerly SFAS No.19). Under the full cost method, all costs incurred in acquiring mineral interests, exploration, development, and construction are capitalized into cost centers. On the other hand, the successful efforts method allows the deferral of expenditures from successful projects while those from unsuccessful ones are immediately expensed.

IFRS 6 (Exploration and Evaluation of Mineral Resources) requires exploration and evaluation (E&E) assets be measured at cost upon initial recognition. Afterwards, it allows either the full cost or successful efforts method. However, the accounting policy regarding E&E assets needs to be determined beforehand and applied consistently thereafter.

Property acquisition costs, including leasehold costs, are capitalized under both accounting standards. In addition, E&E costs are typically capitalized at a lease or well-level regardless of which method is used. However, geological and geophysical (G&G) costs are expensed as incurred under the successful efforts method of US GAAP, whereas IFRS allows G&G costs to be capitalized or expensed immediately based on the accounting policy elected.

In the development and production phase, the full cost method under US GAAP allows capitalization of development costs at a full cost center level, while the successful efforts method allows capitalization at a field level. Costs related to production activities are expensed as incurred in both methods. IFRS, on the other hand, does not provide specific standards for the accounting of activities in the post-exploration and evaluation phase.

Because joint ventures are common in this industry, companies must take into consideration the more restrictive definition of a joint venture under IFRS, which requires the existence of a contractual arrangement where two parties undertake an activity that is subject to joint control. US GAAP does not explicitly require the existence of joint control and simply defines a joint venture as 'an entity owned and operated by a small group of businesses (the joint venturers) as a separate and specific business or project for the mutual benefit of the members of the group' (ASC Glossary).

Aerospace and Defense

Industry Overview

The aerospace and defense cluster is comprised of three primary activities: 1) aerospace - manned expeditions to the atmosphere and outer space; 2) aviation - the production and operation of aircraft flown within the earth's atmosphere; and 3) defense - military aircraft and other defense activity. Texas is home to a diverse set of businesses within this industry cluster including NASA, commercial airline operators and defense contractors. In addition, the state is home to two of the largest and busiest airports in the nation: Dallas-Fort Worth International and George Bush Intercontinental. Major airline companies headquartered in Texas include Continental Airlines, American

Airlines and Southwest Airlines. Dallas and Houston also house numerous defense contractors that provide a large number of jobs in the state.

Key Issues

One of the biggest impacts of the conversion to IFRS for the aerospace and defense cluster relates to the scope and methods of accounting for contracts and revenue recognition because of the contractual nature of projects within this cluster. Professional judgment must be exercised when determining whether or not a production or manufacturing project falls under the scope of IAS 11 (Construction Contracts) or IAS 18 (Revenue). A contract qualifies under IAS 11 if it involves, primarily, the construction of tangible assets or the creation of intangible assets, and the agreement covers the construction or combination of assets that are interrelated in terms of design, technology, and function or purpose.

When accounting for major maintenance costs related to property, plant, and equipment (PP&E), US GAAP and IFRS also present some differences. By US GAAP, maintenance and overhaul costs can be either expensed as incurred or deferred and amortized until the next maintenance period. PP&E is not depreciated based on a component approach. In contrast, IFRS requires that all significant and separate components of PP&E with different lives be depreciated separately. In addition, maintenance and overhaul costs are generally capitalized.

Inventory costing and valuation are consistent between US GAAP and IFRS in most respects since the aerospace and defense industry cluster does not commonly use the LIFO costing method, which is expressly prohibited under IFRS.

Biotechnology & Life Sciences

Industry Overview

Another industry cluster that is vital to the future economic growth of Texas is biotechnology and life sciences. This cluster has more than 3,200 establishments employing over 84,000 workers that work in diverse fields including pharmaceuticals and medical devices, agriculture, marine and fisheries and biohazards. The core biotechnology establishments are located in the metropolitan areas of Houston, Dallas-Fort Worth, Austin and San Antonio. The biotechnology and life sciences cluster is regarded as a top priority for state lawmakers as evidenced by substantial appropriations to advance research and other activities. In 2001 alone, the legislature approved $800 million worth of appropriations for science, engineering and commercialization, with $385 million allocated specifically for research.

Key Issues

One of the most important considerations is the treatment of intangible assets, particularly research and development (R&D) costs, which are a major expenditure for biotechnology and life sciences companies. Non-contractual R&D costs are generally expensed as they are incurred under US GAAP unless such costs relate to activities with an alternative future use. On the other hand, IAS 38 (Intangible Assets) distinguishes between research costs and development costs. Non-contractual research costs are expensed as incurred, however, development costs are capitalized if they meet a set of criteria prescribed by IAS 38R.57, including technical feasibility and intention of completing the intangible asset, the ability to use or sell the intangible asset and generate future economic benefits, the availability of adequate resources to complete the intangible asset and the ability to reliably measure the expenditures attributable to the intangible asset during its development.

In reporting business segments, particularly in the pharmaceutical industry, IAS 14 (Segment Reporting) requires a two-tier approach wherein primary segments are characterized by the products and services offered by the company, and secondary segments are based on geographic location. However, if geographical risks are dominant, this order is reversed. According to IAS 14, primary segments should be the main areas of disclosure and only limited information should be presented on secondary segments. This directive allows for better comparability between segments of the same entity and other entities within the industry.

For pharmaceutical companies and other establishments within the life sciences industry that sell commercial products, the key differences in inventory costing and valuation between US GAAP and IFRS must also be considered, including the prohibition of LIFO under IFRS, variations in inventory valuation and reversals of inventory write-downs.

Overall, industry-specific changes as a result of the convergence with IFRS are inevitable and must be addressed promptly and appropriately. Given the potential impact of these changes, companies must devise a systematic way to transition smoothly into the new accounting standards.

SUGGESTED APPROACHES TO IFRS CONVERSION

The two general approaches to implementing IFRS are the all-in approach and the tiered approach. The all-in approach works best for relatively short timeframes, where a company commits a significant amount of time and resources into simultaneously converting all of its reporting entities. Dedicated project teams are created to assist in successfully carrying out the immediate changes. Companies in the European Union used this approach after regulators imposed limited timelines. As a result, the all-in approach forced most companies to rush through the process and numerous inefficiencies were encountered.

A tiered approach (planning, implementation, communication and assessment stages) would result in a more systematic conversion to IFRS, albeit requiring a much longer timeline. Because the convergence of standards in the U.S. is still in its early stages of development, companies are strongly encouraged to initiate their planning stages as soon as possible. Considering 2015 as the earliest year for an SEC-mandated transition to IFRS, companies should assess their needs and outline a roadmap towards the imminent change. If a tiered

approach is used, it should be done on a country-by-country or region-by-region basis, so that a successful implementation in one group can easily be applied to other regions or countries within the next group.

CONCLUSION

The inevitable onset of IFRS and the expected convergence with US GAAP highlights the necessity of gaining a basic understanding of the upcoming changes to accounting standards. As more companies outside the U.S. conform to IFRS, U.S. companies will feel the pressure to follow suit in order for investors to compare financial information between companies globally. Transitioning into IFRS will require extensive planning and assessment in order to achieve efficiency as companies begin to conform to new standards. The impact of this change extends beyond reporting and will affect all facets of a company's operations, including information technology infrastructures and tax reporting procedures. Establishing a roadmap, adopting a strategic approach and training employees can aid in a successful transition to IFRS.

Regardless of how soon adoption of the new standards takes place, providing employees with an overview of IFRS is timely and relevant. According to a study conducted by the AICPA[3] (May 2009), U.S. accountants now recognize the need to obtain basic knowledge of the new standards and are striving to educate themselves about IFRS. Only 22 percent of the survey participants had no knowledge of IFRS whatsoever. The rest have already acquired a basic understanding of the new standards.

The initiative of the FASB and IASB to agree on a unified set of accounting standards may open up new opportunities for both companies and investors as comparability of financial statements increases on a global basis. While the initial costs related to setting up IFRS-compliant systems and educating employees may seem daunting, the benefits of a universal set of rules should outweigh those initial costs, especially for public companies with operations outside U.S. borders. Ideally, the convergence of US GAAP and IFRS will lead to a reporting system that matches today's global approach to doing business.

ENDNOTES

1. CNBC, http://www.cnbc.com/id/25350187/site/14081545/

2. Best and worst states for business 2010. (May/June 2010). Chief Executive

3. US CPAs still evaluating international accounting standards, recognize need to learn IFRS. (May 14, 2009). AICPA

LOCATING OPTIMAL CITIES FOR ENTREPRENEURIAL OR BUSINESS STARTUPS, WITH A TEXAS FOCUS: USING RECENTLY DESIGNATED MICROPOLITAN STATISTICAL AREAS

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INTRODUCTION

Those contemplating entrepreneurial or business startups[1] often assume success is possible if they conceive a new or better idea addressing some unmet need of a customer group or geographic market. However, as many businessmen or entrepreneurs know (or will eventually learn) while a good idea is important, the viability of any business startup depends on many additional key business variables including geographic area and/or city location, site location, business type, business size, competition, economic conditions, operating costs, and market structure, along with market size and rate of market growth embedded within markets or geographic areas. Of the many important business variables that affect business startup success, city and site location are some of the most important (Ghosh & Craig 1983, Wood & Tasker 2008). A successful city and site location may provide any business firm with advantages that competition may find difficult to overcome.

Given the importance of successful city and site location in entrepreneurial or business startups, we will focus on two types of location decisions facing business managers. First, we will explore locating any business by finding a viable, growing, economic hub anchored by a small urban area, called a Micropolitan Statistical Area. These Micropolitan Statistical Areas tends to be (but not always) fast growing small urban areas that may be an optimal location for a business startup. Second, we will introduce methods to find an optimal business site within an urban area, or city, using Bayesian statistical techniques (Duan & Mela 2009) and we will also present suggested checklists for site location based on past experience (Rogers 2007; Wood & Tasker 2008).

When an optimal city and site location is found, and if the market dynamics are favorable and sufficient, the likelihood of success for any new business, increases, sometimes exponentially (Timmons and Spinneli 2005). Thus, the successful creation of business value is largely dependent upon the degree to which the respective market dynamics within an area or region, and specific site, within which the business startup will be conceived, located and implemented.

Based on this notion, it stands to reason the more dynamic the market in an area or region, the more viable the new business startup, *ceteris paribus*. Drawing from an analysis of the macro-environment, changes in demographic and population trends may signal an emerging new market and an opportunity for any business or retail store. For example, Wal-Mart's early success was based in part by locating thousands of their stores in smaller cities which had few discount stores (Levy & Weitz 2007). Duan & Mela (2009) state that Dollar General stores added 2,426 stores in a four year period, from 1999-2003, and many of these new Dollar General stores were located in areas that are now designated as Micropolitan Statistical Areas (MSA). Because of the magnitude of scope and required resources, few small enterprises could, in reality, pursue these opportunities on such a grand scale. How might small or medium-sized businesses use this information to identify potential opportunities for business startups that may be pursued with their capabilities and limited resources? One means is to explore the rates of change in population of a county, an area within a state, or geographic region of the United States. If a dynamic area, or MSA, is identified, it is more likely the small businessman could bootstrap limited resources and pursue an opportunity embedded within some niche of a smaller urban area. Nonetheless, embedded within this approach is the assumption that dynamic changes in population are, in themselves, an indicant for success for a new venture, or any business startup. The authors' analysis suggests an aggregate change in population may be a necessary, but not sufficient, indicant for new venture, or new business success. We have identified, and will discuss in this paper, a key indicant for new enterprise success which is the degree to which internal migration (people moving into an area from within the United States) drives potentially profitable changes in population. Specifically, the authors' analysis of U.S. Census data leads us to conclude that population growth/internal migration is one of several significant underlying processes affecting new firm creation in the U.S. People moving from one area to another within the United States tend to have more income or wealth in order to pay for the move, and thus to buy products, than the general population.

Given the importance of population growth/internal migration for locating new venture, and/or new firm startups, a fundamental question remains; "How may a small businessman or entrepreneur identify these geographic areas, or urban areas, within the U.S. that are growing significantly and are possible "hot beds" of economic activity?" One may suggest the Inc. Magazine listing of "Boomtowns '07" (Kotkin, 2007) or Forbes special report recommending the "Best Places for Business and Careers" (Badenhausen, 2010). Nevertheless, as informative as these lists may be in identifying a potential city or region, these have become 'common knowledge', especially for existing businesses, domestic or global, that are interested in building new businesses, or expanding, or to increase market share. Thus, these lists lose much of their appeal because they are well known by potential competitors. Therefore, how might a small businessman or entrepreneur identify cities or regions that may

be somewhat hidden from general view, but are just as, or more so, economically viable?

U. S. CENSUS AND MICROPOLITAN STATISTICAL AREAS

Prior to 2003, the U.S. Census Bureau identified population centers as Metropolitan centers with all other areas being classified as rural. However, it was becoming clear that "out in the vast nonmetropolitan part of the country, there were urban population centers that are quite important to businessmen and were being lost in our analysis" (Ratcliffe, M., chief of the bureau's population distribution branch, as quoted in McCarthy, 2004). As recorded in the Federal Register in December of 2000 (Federal Register, 2000), the United States Office of Management and Budget (OBM) introduced new standards, termed "core-based statistical areas" (CBSA) for defining population clusters within the United States to be applied to Census Bureau data effective June 6, 2003. Consequently, a new census category was created and was termed "Micropolitan Statistical Area." (A Micropolitan Statistical Area is a different and distinct category from a Metropolitan Area). Micropolitan Statistical Areas are defined as:

"…a core area containing a substantial population nucleus, together with adjacent communities having a high degree of economic and social integration with that core. Each CBSA must contain at least one urban cluster of at least 10,000 but less than 50,000 in population (although more than 50,000 residents can live in the entire Micropolitan statistical area). Under the standards, the county (or counties) in which 50 percent of the population resides within urban areas of 10,000 or more population, or that contain at least 5,000 people residing within a single urban area of 10,000 or more population, is identified as a 'central county (counties). Additionally "outlying counties" are included in the Core-based statistical area (CBSA) if they meet specified requirements of commuting to or from the central counties. The largest city in each Micropolitan statistical area is designated as a 'principal city (U.S. Census Bureau, 2003c).

As of July 1, 2008, with a U. S. Census Bureau internet release date of December 1, 2009, a total of 576 Micropolitan Statistical Areas (MSA)have been identified within the continental U.S., excluding Alaska, Hawaii, and Puerto Rico (U. S. Census 2008b). Brown, Cromartie and Kulcsar (2004), investigated the conceptual validity of the Micropolitan category and concluded that an MSA is an intermediate stage of urban development between larger, more extended metropolitan systems, and smaller more localized rural places.

MICROPOLITAN STATISTICAL AREAS AS POTENTIAL MARKETS

More than 30 million people reside in these Micropolitan Statistical Areas accounting for about 1 out of every 10 Americans and for marketing experts, who help companies decide where to expand, the 'Micropolitans' represent potentially lucrative – and relatively untapped – markets (Nasser 2004, Mulligan & Visas 2006). Various firms have quietly exploited the importance of these population areas, as noted in the Wall Street Journal (McCarthy 2004a). For example, Holiday Inn Express, while averaging two new establishments per week, has placed units in many Micropolitan (Micro) areas. American Profile magazine targeted Micros and has vaulted from a small regional publication to a large national publication in just 6 years. Additionally, Movie Gallery, Inc has rapidly become one of the largest video-rental chains nationwide, in part, by targeting micros with a result of revenues doubling in the last three years. Furthermore, the MSAs themselves are starting to use the "Micropolitan" moniker to market their local area and attract businesses (Lofton 2006) in addition to now being eligible for state and federal funding as a Micropolitan Statistical Area.

Although some firms have been exploiting this change brought on by development, migration, and the shift from farming and manufacturing to an economy dominated by trade and service industries (Nasser 2004), it has not been until recently that the popular press has taken notice of these newly designated Micropolitan Statistical Areas. For instance, an article that appeared in the in the Wall Street Journal (June, 3 2004) entitled *"Granbury, Texas, Isn't a Rural Town: It's a Micropolis"* as well as an article in USAToday entitled *"Small-town USA goes Micropolitan."* As Lang (2004) suggests, these areas are not looked upon as green acres anymore, now just green (as potential business markets). Although Micropolitan Statistical Areas (Micros) may be far removed from a large city, sometimes over 100 miles or more, these areas may have populations over 182,000 (Torrington, CT) and can experience substantial growth, such as 82% in 10 years (Silverthorne, CO). Additionally, they may be as different from one another as Los Angeles is from Detroit (Lang, 2004). For instance, a MSA may be home to a state university, e.g. Nacogdoches, TX, while another may be located near a major tourist attraction, such as Silverthorne, CO.

DYNAMICS OF MICROPOLITAN STATISTICAL AREAS

Micros are drawing residents from both rural America and suburbia, offering some of the cultural attractions and conveniences of cities without all the expenses and liabilities of urban sprawl. Johnson, a sociologist at Loyola University, suggests that with the development of information technology and infrastructure, city workers are now buying second homes in the country and virtually working at home several days a week (Johnson cited in Horowitz, 1998). Furthermore, employers may find it easier to open any new business, such as a factory, in these towns because there is plenty of room for expansion and real estate and labor costs are low in comparison to traditional Metropolitan areas (McCarthy, 2004a). Claborn further suggests there is flexibility for getting things done in Micros because there is less bureaucracy present than is common in large Metropolitan cities. For example, one firm was able to construct a runway so a corporate jet could taxi directly to its plant development. (Claborn as cited in McCarthy, 2004b).

Given the growth and economic advantages of Micropolitan areas, it may be surprising that not one Micropolitan city within Texas; such as Granbury, TX, was mentioned in either the

2007 edition of Inc.Com's "Boomtowns '07" (Kotkin 2007) or in Forbes' 2010 special report on "Best Places for Business and Careers" (Badenhausen 2010)(See Table 1 in Appendix). However, upon closer inspection, one is able to glean that in actuality, the cities in the above lists are actually Metropolitan cities as classified by the Census Bureau. Apparently, Micropolitan Statistical Areas are still off the radar screens of many writers in the popular business press, even though Granbury, Texas grew by 39.5 percent in population from 1990 to 2000 (McCarthy, 2004a), and by 22.1% from 2000-2008 (see Tables 2 & 4, in appendix). For a listing of all 44 Micropolitan Statistical Areas in Texas, see Table 1: Micropolitan Core-Based Statistical Areas (CBSA) within Texas, in the appendix.

Although Micros have reached a certain population threshold and can experience dynamic growth, not all Micropolitan areas are a hot bed of economic activity. As with some Metropolitan areas, populations within a Micropolitan area may actually stagnate, or dwindle. Mulligan & Vias (2006) studied data from the 1980, 1990, and 2000 U. S. Census, and concluded that Micropolitan areas with large government transfer payments, such as welfare, disability, social security payments, etc., may have stagnant or negative population growth. In other words, not "all" Micropolitan areas are good targets for a new business. However, by following our suggested due diligence, an enterprising entrepreneur may identify and parse out those Micros that are not only dynamic and lucrative but also a good fit with their business concept.

The means by which one can delineate the dynamics embedded in any Micropolitan area - over time - begins by first obtaining the most current listing of all Micropolitan Statistical Areas (MSA) within the U. S. (which the U. S. Census Bureau lists together with all Metropolitan Statistical Areas). This data may be obtained by accessing the following URL[2] last updated November 2008, with a U. S. Census Population Division internet release date of August 2009. Although this list is updated yearly, the Census document only identifies principle cites and counties within a state that are associated with the respective MSA. Information concerning population growth or decline and more importantly, economic trends that may be occurring within the particular area, must be found at other Census cites and then melded with the Micropolitan area of interest.

TEXAS MICROPOLITAN EXAMPLE

To demonstrate how to specifically investigate the population dynamics of a given Micropolitan Statistical Area (MSA), we choose the Nacogdoches MSA, partly because it is commensurable with Granbury, it is a Micro located in Texas, but has not received the notoriety of Granbury. The trends in population change for the Nacogdoches MSA and Granbury MSA (which is located in Hood & Somervell counties) must be established to serve as a base for comparison. This information may be obtained in a table published by the Census Bureau depicting the change in population within counties (and state) between 2000 and 2008. Please see Table 2: Population Change for Counties of Texas from 2000 to 2008 for Nacogdoches MSA, and Granbury MSA, in the appendix.

The data in Table 2 show the population of Nacogdoches MSA has grown 6 percent from 2000 to 2008 with a population total of 62,768 in 2008, while the population of Granbury MSA grew 22.1% over the same time period, with a population of 50,573, in Hood County, and 7,942 in Somervelle County, for a population total of 58, 515 in 2008 (also see Table 4 in appendix for Granbury MSA population percentage increase). According to Table 2, for comparison, the State of Texas grew 16.7 percent from 2000-2008, with a total population of 24,326,974 in 2008. Having established a longitudinal base-line through the year 2008, the next step is to identify what may have happened to cause these population trends and changes through 2008. Table 2 shows both Texas and these Micro areas are increasing in population; however, the signs of slower growth, when comparing Nacogdoches MSA to Granbury MSA, are self-evident. Furthermore, the percentage growth in population for Nacogdoches MSA is much lower than the state of Texas, suggesting there are other Micro areas in Texas that are growing much more rapidly than Nacogdoches.

This trend, by year and over time, is insightful; however, this information lacks certain specificity as to what are the actual drivers, or causes, of this change. Nevertheless, by accessing Table 3, entitled Cumulative Estimates of the Components of Population Change, there is a means by which more detailed information pertaining to the growth (or decline) in population may be obtained. Within Table 3, the net change in population by year is delineated into four categories; deaths, births, net international migration,[3] and net internal migration. By this delineation, one can specifically identify the actual drivers of growth (or decline) in population over a given period. As this richer information in Table 3 suggests, the drivers of growth for the Nacogdoches MSA are births and net international migration, off setting population loss to deaths and the negative net internal migration (a net of 848 people have left the county, to live elsewhere in the U.S., in an eight year period). Although the overall net effect over 8 years was a positive increase of 3,565 for Nacogdoches MSA, compared to Granbury MSA's increase of 9,473(Hood County) & 1,133 (Somervell County) for a 2 county total population increase of 10, 606. The dynamics underpinning the marginal population increase in Nacogdoches MSA is very revealing. As a point of comparison, the key driver of population growth for the Granbury MSA is internal migration, rather than births or international migration. In other words, Granbury is growing from people moving "into" the area "from within" the United States. Without question, very different dynamics are underpinning the population change within the respective Micropolitan areas.

As inferred in our earlier discussion we suggest that population growth by internal migration is a significant underlying process affecting new firm births. People moving into any city or Micropolitan area from other parts of the U.S. tend to have more wealth in order to pay from their move, and thus buy more products. In other words, one may argue that the higher the internal migration is into an area, the higher the percentage

increase in new firms or establishments will be for the area. To check if this relationship holds, we return to the Nacogdoches MSA and Granbury MSA and compare and contrast specifically: a) population growth, b) internal migration, and c) net change in establishments over an eight-year time frame for 2000-2008. (2008 data is the latest that may be obtained as of this writing.)

From the above sources already mentioned, we first determined the net change in population and the percent increase in population for the two areas during the decade. To tabulate net firm establishments for the two areas, we accessed County Business Patterns Economic Profiles[4] for these two MSAs within Texas. Table 4 in the Appendix depicts our synthesis of information from these tables. As may be gleaned from the statistics, Granbury's population increased 22.1 percent in comparison to Nacogdoches' increase of 6.0 percent during the 2000-2008 time period. However, the driver of growth for Nacogdoches was births and International migration while that of Granbury was internal migration, accounting for 93.9 % of the net change in population. Given these dynamics of population change and different drivers of this change, it is interesting that the Granbury MSA had a net increase of 338 business establishments, a 30.9 percent increase from 2000. For the Nacogdoches MSA and the accompanying negative internal migration, there was a net decrease of 27 business establishments for the entire eight-year time frame. In sum, Granbury MSA had a 338, or 30.9 percent, net increase in business establishments as compared to a negative 27, or 2.1%, decrease for Nacogdoches MSA. Using a simple longitudinal comparison of two Micropolitan Statistical areas within one state, the data suggest that the relationship between population/ net internal migration and new establishments may be robust. Moreover, from an economic perspective, one may infer Granbury MSA is much more dynamic and would appear to be fertile ground for any new business.

AN INTRODUCTION TO RETAIL/BUSINESS SITE LOCATION

We now shift from locating geographic areas (Micropolitan Statistical Areas) for entrepreneurial or business startups, to locating specific sites for a business within any geographic area or city. Readers of business, marketing, geographic, and service industry related journals may be impressed by the advances made in statistical techniques, and software, used for business and retail site location forecasting over the last few decades (Ghosh & Craig 1983, Rogers 2007, Wood & Tasker 2008, Duan & Mela 2009.) The continuing development of statistical techniques, and software, along with ever increasing real estate prices, and larger costs for new store buildings, along with higher inventory and labor costs, has led to a situation where many retailers and entrepreneurs are more willing to invest additional time and money in potentially optimal business site or retail store location forecasting, and consulting, in order to reduce investment risk (Wood & Tasker 2008). Popular examples of mathematical and economic models that have been used for assessing optimal store site location are gravitational and spatial models. The most basic form of all gravitational and spatial models, the 1962 Huff model, may be found in a Journal of Marketing article by (Ghosh & Craig 1983). The Huff model is a good place to start learning about Bayesian statistical models. The Huff model is based on the concept that the value of a retail store is principally dependent on the size of the store and the distance separating consumers from the store. In 1983 Ghosh and Craig introduced a more advanced spatial model, also a Bayesian statistical model, which includes additional variables such as product quality, competitors and their locations. Bayesian statistical models are basically a series of statistical formulas, all of which must be calculated in order to discover, for example, the potentially optimal new business site or retail store location.

A recent example of a more complex spatial model that has been used for forecasting potentially optimal business site location is the Duan & Mela (2009) model, which is also the most advanced Bayesian statistical model currently available. A summary of the logical structure of the Duan and Mela (2009) model now follows. First, the process builds a model of a local market by quantifying the demand and supply features of existing businesses. Second, the process creates a simulation that calculates the equilibrium of the market among existing businesses. Third, the process uses a Bayesian statistical comparison of businesses to determine latent (or unknown) spatial effects of location on demand. Fourth, the process applies the latent spatial effect to proposed sites to determine the optimum location (s) for new businesses in the market. A detailed analysis of the Duan & Mela (2009) model, and its potential business uses, is available from the authors of this paper. The Duan & Mela (2009) model was tested using an actual set of preexisting data about apartments located in Roanoke, Virginia, to demonstrate how this model, using latent spatial effects, leads to a more optimal apartment location recommendation that improved profitability by 66% over previous models that ignore latent spatial effects. It appears that the Duan & Mela (2009) model is a significant improvement in forecasting optimal site location for apartments and possibly for new businesses or retail stores.

If an entrepreneur, or business person, lacks the statistical skills, or software, to perform the statistical calculations mentioned above, they may use the following suggested check lists, based on past experience, that have been used to help locate specific sites for new businesses. A detailed analysis of these suggested checklists is available from the authors of this paper. Rogers (2007) has developed a suggested checklist of eight key variables to help in business site location. Wood & Tasker (2008) has developed a suggested checklist of 30 variables that may be used in business site location. The information presented in this article may help reduce the investment risk involved in locating any new business.

CONCLUSION

In use of the Tables from the U. S. Census Bureau and inferences drawn there from, three caveats need to be mentioned. First, within any given year, the net change in the number of business establishments, per NAICS code, is underpinned by births and deaths of establishments for the respective year. For example, the net increase in establishments for Texas from 2002 through 2003 was 4,183. However this figure is comprised of 52,677

births and 48, 494 deaths of establishments of varying sizes (<500 & 500+ employees). Regrettably, the data is not fine-grained enough to identify births and deaths at the county level (U.S. Census Bureau 2003a). Second, establishments are not differentiated as to establishments that are new retail stores or other business startups (sole proprietor with majority interest in the enterprise) or establishments that are new to the area but belong to an existing enterprise with headquarters residing in a different locale. Furthermore, the type of business, e.g., franchise or not, is not specified. However, as a proxy of establishment makeup, Shaver, et al (2001) found that within the Panel Study of Entrepreneurial Dynamics, greater than 6 out 10 of the 5,765 firm startups in the PSED study were those that were "… were alone or with others trying to start a new business". Finally, our analysis did not include non-employer data. Non-employer statistics are comprised on establishments and sales receipts of business without paid employees. Within this category, most non-employers are self-employed individuals operating very small, unincorporated businesses, which may or may not be the owner's principal source of income (U.S. Census Bureau, 2003a).

The above discussion helps to demonstrate that very different market dynamics may exist in one Micropolitan area, compared to another Micropolitan area. Nevertheless, past research, the above cites, and the information that may be gleaned from the U.S. Census Bureau, provides a means by which trends of a Micropolitan Statistical Area may be objectively assessed and thereby enable an entrepreneur or business person to begin to determine the degree to which their idea is, in actuality, an opportunity. We acknowledge different dynamics may be more pertinent to a new venture startup, for the process is context specific and highly situational. However, identifying urban clusters that are relatively unknown (Micropolitan Statistical Areas) but are very dynamic economically, should arguably increase the probability of success for a new enterprise.

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ENDNOTES

1. Entrepreneurial or business startups may include new ventures or other new business startups such as retail stores, manufacturing, small businesses, service businesses, hotels, tourism businesses, apartments, etc.

2. (http://www.census.gov/population/www/metroareas/lists/2008/List1.txt)

3. Definitions are provided within Table 3: Note 1 and Note 2

4. http://www.census.gov/econ/cbp/index.html.

APPENDIX

Table 1: Micropolitan Core-Based Statistical Areas (CBSA) Within TEXAS

City and County[1] July 1, 2008, published December 1, 2009					BOOMTOWNS '07 INC[2]		BEST PLACES FORBES 2010[3]
Alice	10860*	48249**	Jim Wells County		Abilene		Abilene
Andrews	11380	48003	Andrews County		Amarillo		Amarillo
Athens	11980	48213	Henderson County		Austin Round Rock		Austin
Bay City	13060	48321	Matagorda County		Beaumont-Port Arthur		Beaumont
Beeville	13300	48025	Bee County				
Big Spring	13700	48227	Howard County		Brownsville-Harlingen		Brownsville
Bonham	14300	48147	Fannin County		Bryan-College Station		College Station
Borger	14420	48233	Hutchinson County				
Brenham	14780	48477	Washington County				
Brownwood	15220	48049	Brown County				
Corsicana	18620	48349	Navarro County		Corpus Christi		Corpus Christi
Del Rio	19620	48465	ValVerde County		Dallas-Plano-Irving		Dallas
Dumas	20300	48341	Moore County				
Eagle Pass	20580	48323	Maverick County		El Paso		El Paso
El Campo	20900	48481	Wharton County				
Fredericksburg	23240	48171	Gillespie County		Ft Worth-Arlington		Fort Worth
Gainesville	23620	48097	Cooke County				
Granbury	24180	48221	Hood County				
	24180	48425	Somervell County				
Hereford	25820	48117	Deaf Smith County		Houston-Baytown-Sugar Ld.		Houston
Huntsville	26660	48471	Walker County				
Jacksonville	27380	48073	Cherokee County				
Kerrville	28500	48265	Kerr County		Killeen-Temple-Foot Hood		Killeen
Kingsville	28780	48261	Kenedy County				
	28780	48273	Kleberg				
Lamesa	29500	48115	Dawson County		Laredo		Laredo
Levelland	30220	48219	Hockley County		Longview		Longview
Lufkin	31260	48005	Angelina County		Lubbock		Lubbock
Marble Falls	31920	48053	Burnet County				
Marshall	32220	48203	Harrison County		McAllen-Edinburg-Pharr		McAllen
Mineral Wells	33420	48363	Palo Pinto County		Midland		Midland (new)
Mount Pleasant	34420	48449	Titus County				
Nacogdoches	34860	48347	Nacogdoches County				
					Odessa		Odessa
Palestine	37300	48001	Anderson County				
Pampa	37420	48179	Gray County				
	37420	48393	Roberts County				
Paris	37580	48277	Lamar County				
Pecos	37780	48389	Reeves County				
Plainview	38380	48189	Hale County				
Raymondville	39700	48489	Willacy County				
Rio Grande City	40100	48427	Starr County				
Snyder	43660	48415	Scurry County		San Angelo		San Angelo
Stephenville	44500	48143	Erath County		San Antonio		San Antonio
Sulphur Springs	44860	48223	Hopkins County		Sherman-Denison		Sherman
Sweetwater	45020	48353	Nolan County				
					Texarkana		Texarkana
					Tyler		Tyler
Uvalde	46620	48463	Uvalde County				
Vernon	46900	48487	Wilbarger County		Victoria		Victoria
					Waco		Waco
					Wichita Falls		Wichita Falls

* Core Based Statistical Area code; ** FIPS state/county code

1) Adapted from Micropolitan Statistical Areas And Components, released December 1, 2009, With Codes;

2) Adapted from Inc Magazine: Boom Towns '07

3) Adapted from Forbes.com: Best Places for Business and Careers 2010.

Table 2

Cumulative Estimates of Population Change for Counties of TX and County Rankings: April 1, 2000 to July 1, 2008				
State/County	Population estimates		Change, 2000 to 2008	
	July 1, 2008	April 1, 2000 estimate base	Number	Percent
Texas	24,326,974	20,851,792	3,475,163	16.7
Nacogdoches County	62,768	59,201	3,565	6.0
Hood County	50,573	41,100	9,473	23.0
Somervell County	7,942	6,809	1,133	16.9

Adapted from Table 2: Cumulative Estimates of Population Change for Counties of Texas and County Rankings: April 1, 2000 to July 1, 2008, http://www.census.gov/popest/counties/CO-EST2008-02.html.

Table 3

Cumulative Estimates of the Components of Population Change for Counties of Texas: April 1, 2000 to July 1, 2008							
State County	Total Population Change*	Natural Increase			Net Migration		
		Natural +/_	Births	Deaths	Total	Net International Migration	Net Internal Migration
Texas	**3,475,163**	**1,884,947**	**3,165,880**	**1,280,933**	**1,563,694**	**851,909**	**711,785**
Nacogdoches County	3,565	3,266	7,758	4,492	577	1,425	-848
Granbury							
Hood County	9,473	165	4335	4170	9404	396	9008
Somervell County	1133	144	776	632	1040	77	963

Adapted from Table 4: Cumulative Estimates of the Components of Population Change for Counties of Texas: April 1, 2000 to July 1, 2008 (CO-EST2009-04-48) http://www.census.gov/popest/counties/CO-EST2008-04.html

Note 1: Net International Migration: International migration, in its simplest form, is defined as any movement across U.S. (50 states and District of Columbia) borders. The U.S. Census Bureau makes estimates of net international migration for the nation, states, and counties. We estimate net international migration as: (1) net migration of the foreign born, (2) net movement from Puerto Rico, (3) net movement of the U.S. Armed Forces, and (4) emigration of the native born. The largest component, net migration of the foreign born, includes lawful permanent residents (immigrants), temporary migrants (such as students), humanitarian migrants (such as refugees), and people illegally present in the United States. Currently, we do not estimate these components individually

Note 2: **Net Internal Migration -** the difference between internal in-migration to an area and internal out-migration from the same area during a time period. Internal in- and out-migration consist of moves where both the origin and the destination are with in the United States (excluding Puerto Rico). The net internal migration rate expresses net internal migration during a time period as a percentage of an area's population at the midpoint of the time period

Table 4

Population Dynamics and Changes in Net Establishments for Selected Micropolitan Statistical Areas (MSA)[1] 2000-2008							
Time Period 2000-2008	Net Change in Population of MSA	Percent increase in Population	Net Internal Migration (IM)	IM as % of Net Change in Population	# of Establishments by year/ by county[1]	Net Change in Establishments (- / +)	% Change in number of Establishments (- / +)
Nacogdoches MSA	3,565	6.0 %	163	3.3 %	1,317-2000 1,290-2008	- 27	- 2.1 %
Granbury MSA	10,606	22.1 %	9,963	93.9 %	1091 – 2000 1429 - 2008	+ 338	30.9 %

1) County Business Patterns Economic Profile: http://www.census.gov/econ/cbp/index.html (choose county, state and year) U.S. Census Bureau
NOTE: 2008 data is the latest data available for County Establishments
2) IM=Internal Migration

A STUDY OF ELEMENTS OF ORGANIZATIONAL CITIZENSHIP BEHAVIOR (OCB) AND THE OCCUPATIONAL WORK ETHIC INVENTORY (OWEI) OF BUSINESS STUDENTS

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INTRODUCTION

Many human behaviors are dynamic concepts that can influence organizational efficiency and effectiveness. For example, a higher level of "helpfulness" (discretionary kindness) of an employee toward a customer can endear that customer to the organization, resulting in greater loyalty to the organization by that customer (Organ, Podsakoff, and Mackenzie, 2006). This process is sometimes called "building goodwill" and is a simple example of what is termed organizational citizenship behavior (OCB).

Similar to the study of behaviors linked to organizational citizenship are studies of the work ethic that organizational members' exhibit in the workplace. The work ethic concept is multidimensional, intertwined with human behavior, and may contribute to discretionary behavior on the part of employees that promotes efficiency and effectiveness within organizations.

The following study is an attempt to determine if, and to what extent, any linkages or relationships exist between organizational citizenship behavior and work ethics. Two instruments currently exist that can be used to help address this issue, the OCB scale developed by Podsakoff, et al., (1990), and the Occupational Work Ethic Inventory (OWEI) (Petty, 1991)

ORGANIZATIONAL CITIZENSHIP BEHAVIOR

OCB is defined as "Individual Behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and in the aggregate promotes the efficient and effective functioning of the organization" (Organ, Podsakoff, and Mackenzie, 2006, p.3). Scholarly writings and research have addressed OCB in variety of related frameworks including contextual performance, prosocial behavior, and extra-role behavior. Organ, Podsakoff, and Mackenzie (2006) described *Contextual performance* as interpersonal facilitation or job dedication; *Prosocial organizational behavior* as "any behavior in an organizational setting aimed at improving the welfare of someone to whom the behavior is directed" (p. 32); and *Extra-role behavior* which benefits an organization and exceeds existing role expectations. Extra-role behavior has also been studied within the contexts of whistle-blowing (Near and Miceli, 1987) and principled organizational dissent (Graham, 1986b).

The OCB scale consists of a 24 item 7 point Likert scale used to assess five categorical definitions of organizational citizenship behavior including: (1) *altruism,* (2) *conscientiousness,* (3) *courtesy,* (4) *sportsmanship,* and (5) *civic virtue*. According to Organ, Podsakoff, and Mackenzie (2006, p.251) categories are described as follows:

Altruism: Discretionary behaviors on the part of employees that have an effect of helping a specific other with an organizationally relevant problem.

Conscientiousness: Discretionary behaviors on the part of the employee that go well beyond the minimum role requirements of the organization in the areas of attendance, obeying rules and regulations, taking breaks, and so forth.

Sportsmanship: Willingness of the employee to tolerate less than ideal circumstances without complaining – to "avoid complaining, petty grievances, railing against real or imagined slights, and making federal cases out of small potatoes" (Organ, 1988, p. 11).

Courtesy: Discretionary behavior on the part of an individual aimed at preventing work-related problems with others from occurring.

Civic Virtue: Behavior on the part of an individual that indicates that he/she responsibly participates in, is involved in, or is concerned about the life of the company. (Podsakoff, et al., 1990, p.115)

Based on concepts provided by Organ (1988) the OCB scale was developed by Podsakoff, et al., (1990). Items representing each of the five categorical definitions were provided to colleagues who were tasked with Q-sorting the items into the most appropriate OCB category. A provision was made for a sixth category for any item that didn't fit any of the conceptual definitions for each OCB category (Organ, Podsakoff, and Mackenzie, 2006). Podsakoff, et al., (1990) administered the scale to 988 employees of a diversified petrochemical company. Eighty percent of the participants had college degrees. A confirmatory factor analysis was used to test the hypothesized five-factor analysis (Organ, Podsakoff, and Mackenzie, 2006). A Tucker Lewis Index of .94 indicated a good fit with the data. Internal consistency reliabilities resulted in alphas that averaged .81 across the five categories of the OCB scale. Empirical distinction for all the categories where indicated by discriminate validity tests which also revealed that approximately two thirds

of the variance for *altruism* was shared with *conscientiousness* and *courtesy* (Organ, Podsakoff, and Mackenzie, 2006).

A study conducted by Ishak (2005) revealed the impact working relationships between supervisors and subordinates have on performance considered beyond the scope of the job. This study was conducted in an attempt to show that (1) individual innovativeness is positively related to the OCB dimensions, and (2) superior-subordinate relationships mediate the relationship between individual innovativeness and OCB. Data was collected from 385 non-managerial bank employees using the OCB scale, measurement items for innovative behavior (George and Zhou, 2001) and superior–subordinate relationship (Liden and Maslyn, 1998). Results indicated that individual innovativeness had a positive significant influence on three of the five dimensions of the OCB including altruism, civic virtue, and conscientiousness but failed to show a significant relation to the dimensions sportsmanship and courtesy. Data measurement pertaining to Superior-subordinate relationship was determined to fully mediate the relationship between individual innovativeness and the OCB dimensions of altruism, civic virtue, and conscientiousness. Data also revealed that "the direct effects of individual innovativeness on OCB decrease and become insignificant after superior-subordinate relationship is considered" (Ishak, 2005, p.8).

In an earlier study Bolino, Turnley, and Bloodgood (2002) suggested that an organization's ability to improve its structural, relational, and cognitive forms of citizenship behavior depends on the development of social capital. Behavioral characteristics that influence diversity initiatives are the products of values, attitudes, and customs that are learned and shared between individuals with similar ethnic backgrounds. These behavioral characteristics may have mediating affects on desired Organizational Citizenship Behavior that contributes to the growth of social value within the organization. An example of mediating affects is Negative Affectivity (NA).

Research conducted by Jones and Schaubroeck (2004) revealed that NA is exhibited by individuals prone to experiencing negative mood states and who are unlikely to demonstrate helpful behaviors. A survey pertaining to the effects of workplace demands on employee psychological and behavioral outcomes was conducted on 170 employees in two divisions of a large hospital in the Midwestern United States further divided into 17 departments. Approximately 91% of these employees were white, 86% were female, and 9% listed as non-white were African-American, Asian/Pacific Islander, Native American/ Native Alaskan, or Hispanic. Findings of this study revealed race had a significant effect on negative affectivity (NA) which supported Jones' and Schaubroeck's prediction that minority participants would report higher levels of NA. Co-worker social support and NA were also shown to be significantly related. Job satisfaction was found to be significantly related to internalization commitment. Overall the total effect of race on job satisfaction was significant with a ($p<.01$). Jones and Schaubroeck (2004) also stated "beyond its connection to affect, job satisfaction may also be seen to represent a cognitive appraisal of how one benefits from the job" (p.2).

Ryan (2002) conducted a study to measure the relationship between the Protestant Work Ethic (PWE) and Organizational Citizenship Behavior (OCB) based on "the proposition that individual work values account for increased OCB over and above OCB related to the contextual variable organizational justice" (p. 124). Measures used in this study consisted of a three-dimensional OCB survey developed by Podsakoff and Mackenzie (1993), a one dimension ten item scale to measure procedural justice proposed by Moorman, Niehoff and Organ (1993), and a twelve item short form of a multidimensional PWE scale developed and validated by Blau and Ryan (1997). The analysis of data collected using two separate survey data samples representing professional accountants, administrative personnel, and Catholic parishioners who were full-time employees revealed a positive and significant relationship between OCB and two dimensions of the PWE, hard work and independence.

Barbuto, Brown, Wilhite, and Wheeler (2001) tested the relationship between sources of motivation and OCB. Using the Motivation Sources Inventory (Barbuto & Scholl, 1998) and a modified version of the OCB instrument that measured altruism and generalized compliance (Organ, 1997; Smith, Organ & Near, 1983) data were collected from 175 participants in 31 locations of two agriculturally based companies. Simple statistical and zero-order correlation testing revealed statistically significant relationships between instrumental, self-concept external and self-concept internal motivation and organizational citizenship behaviors.

Truckenbrodt (2000) conducted a study designed to assess the quality of the relationship between Leadership Management Exchange (LMX) and subordinate's commitment and organizational citizenship behavior (OCB). Data was collected from a sample of 204 full-time employees in a highly specialized information technology solutions company using the LMX-7 scale for supervisors and subordinates, the organizational commitment questionnaire (OCQ), and the OCB scale. Based on a confidence interval of 95 percent, Truckenbrodt's findings in relation to research question 1 revealed a statistically significant ANOVA between LMX and organizational commitment with a p value of .0429. Specifically, participants with a higher quality level of LMX scored means higher than participants with a lower quality level of LMX. Findings in relation to research question 2 revealed a statistically significant ANOVA between LMX and OCB with a p value of .0237. Specifically, participants with a higher quality level of LMX scored means higher than participants with a lower quality level of LMX.

OCCUPATIONAL WORK ETHIC

Work values and behavior referred to as occupational work ethics has been described as a component of employability skills (Petty, 1996). Employability skills are a function of behavior and attitudes; Occupational work ethics are displayed behavioral characteristics (work habits, attitudes, and values) based on an individual's personal values and mores while working for income within a paid occupation (vs. sports, religious activities, hobbies, and other avocations) (Petty, 2002).

Similar to the dimensions of OCB are the work ethic characteristics organizational members exhibit in the workplace. The work ethic concept is multidimensional, intertwined with human behavior, and difficult to analyze. Scholarly writings (Bernstein, 1988; Cherrington; 1980, Yankelovich & Immerwahr, 1984) have shown that the malleable nature of people's work ethics presents evolving implications pertaining to their influence on today's work environment. According to Katzell (1979), a person's attitude toward work and work role is a manifestation of his or her persona defined "by what he or she does for a living" (p. 36). Research supporting the foregoing statement includes the development of the Occupational Work Ethic Inventory by Petty (1991) as part of a research project at the University of Tennessee, Knoxville. Research pertaining to occupational work ethic characteristics has been conducted in a variety of education and employment settings.

Research conducted by Brauchle and Petty (1983) using the Work Attitudes Inventory (WAI) revealed five nontechnical work skills: ambition, self-control, organization, enthusiasm, and conscientiousness. The WAI was developed by Petty (1979) from a factor analysis of data previously collected from populations of industrial workers, industrial supervisors, and vocational educators. Brauchle and Petty concluded that the extent of students' work attitude would provide the teaching focus needed to improve students' attitudes. In another study using the Work Attitudes Inventory, the rated level of work attitudes of 113 secondary, community college, and hospital teachers and nine practitioners of health occupations revealed that practitioners rated affective work traits lower than teachers did (Petty, & Campbell, 1988).

Hollenbeck (1984) documented the effects of positive and negative behavior in a study in which employers evaluated applicants on job readiness after watching a series of videotaped interviews. Results of the evaluations revealed that negative behaviors received lower evaluations than nonnegative behaviors. Negative behaviors included language, appearance, mannerisms, and attitude, and such behavior lowered employers' assessments of education and training. Hollenbeck's study also revealed that bad attitude had the greatest effect on an employers' decision to hire.

Petty and Campbell (1986) conducted a research study to examine whether the work attitudes of teachers in health occupations are perceived differently than are those of teachers in other occupations. The Work Attitudes Inventory (WAI) was the instrument used for this study. The population for the study consisted of vocational teachers in health occupations and other trades and industries from 30 counties of eastern Tennessee. The study results revealed some differences between teachers in health occupations and other trades and industries regarding how they perceive work attitudes. Petty observed, "These differences ought to be taken into account by: a) teacher trainers when delivering certification as well as other courses to these populations and b) curriculum writers when developing instructional materials that address work attitudes" (p. 279). In a later study Petty and Campbell (1988) conducted similar research using the WAI. This study compared the work attitudes of a population made up of teachers in health occupations at public secondary schools, public community colleges, and hospital nursing schools to those of health practitioners working in their profession. Research results revealed a difference in work attitudes between teachers and practitioners. Of the five factors of work attitudes, health occupations practitioners scored significantly lower than the teachers in the areas of self-control, enthusiasm, and conscientiousness. Petty and Campbell (1988) indicated that differences yielded by their study revealed interesting issues for teachers in health occupations including the following:

1. Issues of interest in self-control could be manifestations of the daily stresses to which practitioners are subject, and possibly that teachers demonstrate more self-control as a group.

2. Issues of enthusiasm may reflect a generalized self starting attitude towards work and work relationships or of being really interested and excited about one's work.

3. Issues of conscientiousness seems to indicate a more favorable attitude toward this aspect of work than did for practitioners, it may also indicate that practitioners have a different view point on work than do teachers. (p. 63)

Lankard (1990) referred to employability as the fifth basic skill. Employability skills are basic requirements for job success. Lankard described employability as "skills that enable an individual to acquire and keep a job" (p. 2). Good work habits, positive work attitudes, ethical behavior, and cooperation with others are the skills required to keep a job. In addition to skills required to keep a job, Lankard also iterated the importance of integrating employability skill training with academic and vocational skill training.

Hall (1990) and Miller (1981) indicated that information on the work habits, values, and attitudes of vocational-technical students plays a critical role in the development of curriculum. Crosby and Petrosko (1988) suggested that vocational-technical teachers must possess knowledge of student characteristics if they are to effectively use training methods and materials designed to address the affective domain. Petty (1995b) noted that practitioners and teachers are often significantly different with regards to their respective work attitudes. He also observed that "educators who suggest that they know the work ethic of their occupation or that of different groups/cultures may be mistaken" (p. 44). In consideration of differences with respect to work attitudes Petty (1995b) noted that "teacher educators have a responsibility to recognize potential differences in the occupational work ethic in different types of occupations so they can assist teachers in their occupational instruction" (p. 44).

Behavior and attitudes act as a systematic set of values that influence employees' work ethic (Hatcher, 1993). Work ethic is a cultural norm formed in a society that expects all employees to do a good job (Petty, 2002). It is through interaction with family, peers, and other adults that a person learns to place value on work (Hill, 1992). According to Petty (2002), work experience shapes the work attitudes of young people.

In a previous study of students enrolled in secondary vocational programs in 15 schools representing 35 counties in East Tennessee, Allender (1993) categorized the work ethic of secondary vocational students into occupational training area, gender, grade level, hours worked per week, and socioeconomic status using the OWEI. Allender's study revealed that senior level students exposed to 2 or 3 years of vocational training as well as instructors with industrial background possessed the strongest work ethic.

Differences were also found to exist between genders. Petty and Hill (1994) conducted a study to determine whether there were differences in the work ethics of women and men. The OWEI was used to measure work ethic on the subscales of dependable, ambitious, considerate, and cooperation. Data were collected from 2, 279 female and male workers. Results revealed significant differences, with females indicating higher work ethic scores on all four subscales. Petty and Hill reiterated the importance of knowledge associated with differences in work ethic: "Differences detected for gender could affect the training methods and curriculum used by occupational educators in industry, military, and public training programs" (p. 71).

Using Petty's (1991) OWEI, Hatcher (1995) conducted a survey of instructors and students in apprenticeship training to determine their levels of work ethics. A response rate of 90 % (3,822) was obtained. The results revealed high levels of work ethic among the participants, with no significant correlation between length of work and apprenticeship level. The largest difference was based on the maturity of instructors and apprentices.

Hill and Petty (1995) reported that work ethics and employability skills are continually listed as necessary for job success, but efforts to address them in school systems have fallen short of anticipated outcomes. In order to address work ethics and employability skills, educators must decide upon the target objectives to be taught. Hill and Petty pointed out employability skills including work ethic are important skills for prospective employees and employers. Employers anticipate that prospective employees, including new graduates, will obtain employability skills while attending secondary or postsecondary schools. This interdependent relationship between schools and employers as supplier and a customer must be recognized.

Petty (1995a) found that work ethic differed by occupation. The OWEI was used to collect data from 2, 274 workers representing private and public industries. Participants identified their occupation as defined by the Standard Occupational Classification (SOC) system. Dependent variables for the study were identified as (a) working well with others; (b) striving for advancement/success; (c) being dependable; and (d) acceptance of duty. In comparisons of the five age groups, significant differences were revealed for workers 36 to 55 years of age. According to Petty (1995b) these data should be used in the educational system for students to evaluate their affective behaviors and traits for suitability to their chosen occupational field.

The central theme of a study conducted by Petty (1995b) was to investigate different occupations to provide teachers with an analysis of information about the affective domain in order to address it effectively. In this study, Petty compared the work ethic of workers from private industry across standard occupational classifications. Petty used the Occupational Work Ethic Inventory (OWEI) consisting of four factors founded on literature about work attitudes, work values, and work habits that included working well with others, striving for advancement/success, being dependable, and acceptance of duty. The OWEI was developed as part of a research project at the University of Tennessee-Knoxville (Petty, 1991). The results of the study demonstrated that the self-rated perception of work ethic differs by occupations. Historical self-knowledge is a key to shaping the future of career development (Lankard, 1996). Assessments, survey instruments, inventories, and analysis of one's own behavior are examples of self-evaluations (Ohio State University, 1995). Representatives of employers can provide valuable information for the format and objectives of work ethics and other employability skills (Petty, 2002).

In a study conducted on the differences in work ethic as determined by the educational levels of participants Petty (1996) stated that "a part of this working persona is educational level, which can become a central focus of a person's life (p. 47). Petty indicated that educational achievement is as important as occupation regarding one's personal status at social gatherings. The Occupational Work Ethic Inventory (OWEI) was used to measure the participant's level of work ethic on the subscales of dependable, ambitious, considerate, and cooperative. Data were collected from 2,274 workers from private industries. The five levels of education included less than a high school diploma; high school degree or GED; 2 years of college or associate's degree; bachelor's degree; and some graduate work. A multivariate analysis yielded significant differences at the .05 level for all dimensions of the OWEI. The mean scores of respondents for all subscale variables were lower for the less than high school diploma participants than for participants in the higher four levels of education. The scores for the subscale variable ambitious were lower for high school degree or GED participants than for participants in the higher three levels of education; the same results were observed for 2 years of college or associate's degree participants than for participants with some graduate work. The scores for the subscale variable cooperative were interesting in that they were higher for high school degree or GED participants than for participants with some graduate work. Petty (1996) stated "The most salient point of this study was the pattern of lower work ethic scores for the less educated" (p. 55).

Affective skills focus on feelings, emotions, and attitudes and grapple with important psychological traits such as motivation, self-esteem, and socialization (McNabb, 1997). Work ethics are best learned when consistently taught using a combination of direct, indirect, and self-evaluative methods (Wells, 1998). Direct methods include discussions of workplace culture, definitions of work ethics, and case studies. Indirect methods include the use of visiting guest professionals who model behaviors such as prompt arrival times, pride in their work, and loyalty to their employers.

In a paper that addressed skills currently needed for employment Overtoom (2000) referred to The Occupational Information Network (O Net) as a comprehensive database of worker attributes and job characteristics published by the Department of Labor. O Net contains information about job characteristics and employability skills for each job title. O Net was developed to include work values as measured by the Minnesota Importance Questionnaire (MIQ) (McCloy et al., 1999). According to Petty (2002, Literature Section), "The MIQ measures relative importance of 21 vocationally relevant need reinforcers grouped into six value dimensions derived through factor analysis." The six value dimensions identified by the MIQ (McCloy et al., 1999) include achievement, working conditions, recognition, relationships, support and independence. O Net replaced the *Dictionary of Occupational Titles* (DOT) (Overtoom, 2000; Petty, 2002).

Petty, Lim, Yoon, and Fontan (2008) compared the work ethic of manufacturing machine operators between self-directed work teams and traditional work groups using the OWEI. Comparisons were based on OWEI subscales including *dependable, considerate, ambitious, and cooperative.* Differences in work ethic scores were also compared to six demographic variables including age, gender, level of education, years of full-time work experience, and years of supervisory and work shift experience. Significant differences were revealed between the work ethic of two work structures and age groups.

METHODOLOGY

The population for this study was graduate and undergraduate students in a mid-sized university in Central Texas. Specific class sections were selected at random and students were provided with a survey that combined items of both OWEI and OCB. Additionally, demographic information was gathered for use in later research.

To determine the relationship between the OCB factors and the OWEI factors, data was entered into a database and subsequent correlation analysis was performed. The results of the analysis of the initial data (n=159) are shown in Table 1. Most of the OCB and OWEI factors had moderate correlations, the outliers being *Conscientiousness and Sportsmanship*.

Table 1
Correlation Coefficients for OCB and OWEI Characteristics

	Considerate	Dependable	Ambitious	Cooperative
Altruism	.371 (<0.01)	.513 (<0.01)	.379 (<0.01)	.401 (<0.01)
Courtesy	.338 (<0.01)	.567 (<0.01)	.323 (<0.01)	.418 (<0.01)
Conscientiousness	.024	.241 (<0.01)	.112	.153
Sportsmanship	-.038	-.206 (<0.05)	-.140	.053
Civic Virtue	.312 (<0.01)	.312 (<0.01)	.327 (<0.01)	.344 (<0.01)

SUMMARY

This study addresses the relationship between Organizational Citizenship Behavior (OCB) and Occupational Work Ethic (OWE) characteristics. Research has shown job performance behaviors that define OCB and OWE characteristics are important to the effective and efficient performance of organizations. OCB is described in terms of behavior that is discretionary. Research pertaining to OCB has been conducted within the frameworks of contextual, prosocial, and extra-role performance and has been shown to have mediating affects on the growth of social acceptance and respect in the workplace. The work ethic concept is multidimensional, intertwined with human behavior, and difficult to analyze. OWEI characteristics have been described as a component of employability skills that have been shown to be a function of behavior and attitudes. OWEI attributes have been examined within the contextual settings of industry and education. The OWEI has shown good work habits, positive work attitudes, ethical behavior, and cooperation with others are skills required to keep a job. The results of this study show that there are numerous, strong correlations between the OCB and OWEI factors. Further research should be undertaken to determine if correlations between the two instruments holds up when the population under study involves working adults as opposed to university business students.

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ARE INTEREST RATES AND EXCHANGE RATES IMPORTANT DETERMINANTS IN ADR PRICING?

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1. INTRODUCTION

International portfolio diversification has been the subject of debate and research[1] with several studies demonstrating the benefits of international diversification.[2] Recent research on international portfolio diversification suggests that investors can reduce their portfolio risk by diversifying internationally, since returns are less correlated across stock markets than within markets (Eun and Resnick, 1994). Researchers interpret the relatively low correlation between the major world stock markets as indicative of significant potential gains from diversification (Levy and Sarnat, 1970).

American Depositary Receipts (ADRs) provide one avenue for investors to diversify internationally while eliminating the hassles and transaction costs of direct investments in foreign stock markets since they are denominated in and traded in U.S. dollars. Several studies examine the potential gains from diversification using ADRs (e.g., Officer and Hoffmeister, 1987; Jiang, 1998; Wahab and Khandwala, 1993; Kim et. al., 2000; Alganar and Bhar, 2002) and find that ADRs provide diversification benefits.

ADRs are U.S. dollar-denominated negotiable receipts that represent equity shares of foreign companies, which allow foreign companies to be listed and traded in U.S. equity markets. ADRs are popular in the U.S., and the ADR market has been rapidly expanding to meet the growing demand of U.S. investors in their quest for international diversification. At the end of 2004, the trading volume of ADRs on the New York Stock Exchange (NYSE), American Stock Exchange (AMEX), and Nasdaq reached a record high of 39.1 billion shares (an increase of 18% over 2003) valued at $885 billion (an increase of 40% over 2003).[3]

The purpose of this paper is to assess whether analyzing the spillovers from interest rates and exchange rates to ADR returns across industries has more explanatory power than analyzing the spillovers across ADRs from different countries. This paper extends the examination of ADR pricing behavior by analyzing the following issues: (a) The effect of jointly modeling the mean and variance of interest and exchange rates on ADR returns from different industries; (b) The effect of jointly modeling the volatilities of interest and exchange rates on ADR returns from different industries; and (c) Whether there is an asymmetric effect of interest and exchange rate volatilities on ADRs across different industries.

This paper differs from previous research in several respects. First, unlike previous studies which examine the effect of interest rates and exchange rates only on the mean of ADR returns of different industries, this study explicitly tests the simultaneous impact on both expected return and conditional volatility of ADR returns in different industries. Second, it examines the possible role of volatilities of both interest rates and exchanges rates in different industries. Modeling volatilities of interest rates and exchange rates on ADRs of different industries facilitates examining any kind of spillover effects that may exist from interest rates and exchanges rates to ADRs from different industries. Third, unlike previous studies, this study also examines whether there would be any asymmetric impact of positive and negative innovations of the volatility of interest rates and exchange rates on ADR returns of different industries. Fourth, this paper employs the multivariate extension of Nelson's (1991) Exponential Generalized Autoregressive Conditional Heteroscedasticity (EGARCH) model to examine the joint role of mean and variance of interest rates and exchange rates on ADRs of different industries.

Specifically, this paper examines the price and volatility spillovers from interest rates and exchange rates on the portfolio of ADRs from the banking, telecom, and oil & gas sectors for Brazil, U.K., Germany, France, Italy, and Hong Kong. We also examine the asymmetric effects of positive and negative innovations of interest rates and exchange rates on volatility transmission of ADR returns in all three sectors.

Overall, despite some differences across the sectors, the results indicate that price and volatility spillovers exist from interest rates and exchange rates to the three ADR portfolios from the banking, telecom and oil & gas sectors. First, price spillovers exist from interest rates to the banking sector ADRs of Brazil, U.K., France, Italy, and Hong Kong and from exchange rates to the banking sector ADRs of U.K., Germany, France, Italy, and Hong Kong. Second, there is evidence of price spillovers from interest rates to the telecom sector ADR portfolios of U.K., France, and Hong Kong, and from exchange rates to the telecom sector ADRs of Brazil, U.K., and Hong Kong. Third, there are price spillovers from interest rates and exchange rates to the oil & gas ADR portfolios of Brazil, U.K., Germany, France, Italy, and Hong Kong.

With regards to volatility, spillovers exist from interest rates to the banking portfolio of ADRs from Brazil, U.K., Germany, France, Italy, and Hong Kong, and from exchange rates to the banking portfolios of ADRs from U.K., Germany, France, and Hong Kong. Further, we find evidence of volatility spillovers

from interest rates to the telecom ADR portfolios of Brazil, U.K., France, and Hong Kong, and from exchange rates to all six country ADR portfolios. Lastly, volatility spillovers are also seen from interest rates to the oil & gas ADR portfolios from Brazil, U.K., Germany, Italy, and Hong Kong, and from exchange rates to Brazil, Germany, France, Italy, and Hong Kong. Furthermore, with regards to response asymmetry, we find that for interest rates and exchange rates of Brazil, U.K., Germany, France, and Italy, negative innovations increase volatility more than positive innovations do. These findings suggest that these markets are more sensitive to negative innovations originating from other markets than to positive innovations.

We organize the remainder of the paper as follows: In Section 2 we discuss the empirical framework and describe the data in Section 3. We present the econometric methodology in Section 4 and provide our empirical results in Section 5. This is followed by some concluding remarks in Section 6.

2. EMPIRICAL FRAMEWORK

Several studies document the effect of interest rate changes on the pricing of assets. For example, Chen et al., (1986), Gilberto (1985) and Sweeney and Warga (1986) examine the relationship between interest rate changes and stock market performance in the U.S. and find significant correlation. Wong (1990) analyzes the effect of monetary policy on stock returns for the U.S., U.K., Canada, Japan, Germany and Italy and finds that monetary policy significantly influences stock returns.

A broad set of literature examines the impact of Federal Reserve discount rate changes on the U.S. stock markets with varying results. For example, Lombra and Torto (1977) find linkages between discount rate changes and the U.S. stock market during 1968 to 1974. Fenton and Paquet (1998) find that real interest rate differentials between the U.S. and Canada reflect the risk premium that is a result of economic growth differentials between the two countries.

These findings suggest that ADRs, which are backed by foreign securities, could also be affected by movements in both foreign and U.S. interest rates. However, Bonomo, Ferris, and Noronha (1993) examine the effect of U.S. interest rate changes on ADRs and find that ADRs do not react to changes in U.S. interest rates. Notwithstanding this finding, we know that interest rates affect a firm's cash flow position since it influences the cost of capital. However, the home-country money market is usually the main source of current liabilities for foreign firms. Also, changes in short-term interest rates in foreign countries are often affected by changes in U.S. interest rates (Bin et. al., 2003). Thus, when U.S. interest rates change, the foreign country interest rates also change, which in turn affects the operations and profitability of the ADR-originating foreign firm. This impact is transmitted to the value of the underlying stock and ultimately to the ADRs.

Furthermore, since ADRs are quoted in dollars, the price of the ADR reflects not only the changes in the value of the underlying stock but also the exchange rate movements against the dollar. Kim et al. (2000, p. 1362) note, "Although ADRs, being dollar-denominated, do not bear explicit exchange-rate risk, there is an implicit risk in their price due to the convertibility between ADRs and the underlying shares. Even if the price of the underlying share remains unchanged for a period, changes in the exchange rate against the U.S. dollar would make the price of ADRs adjust to avoid arbitrage profits."

There are a few studies that examine the impact of exchange rate fluctuations on ADRs. For example, Liang and Mougoue (1996) examine the ADRs from the U.K., Japan, and South Africa, and find that these ADR returns are sensitive to fluctuations in exchange rates. Jiang (1998) examines the pricing factors for ADRs from Australia, France, the Netherlands, South Africa, Spain, Sweden and the U.K. and finds the exchange rate to be an influential factor in the pricing of ADRs. Kim et al. (2000) analyze ADRs from Japan, U.K., Sweden, the Netherlands, and Australia and document that exchange rates have an impact on ADR prices. Lastly, Bin et al. (2003) analyze select Australian, European, Asian, and Latin American ADRs, and find that not only exchange rates but also interest rates impact ADR returns.

This paper differs from previous research in several respects. First, unlike previous studies which examine the effect of interest rates and exchange rates only on the mean of ADR returns of different industries, this study explicitly tests the simultaneous impact on both expected return and conditional volatility of ADR returns across different industries. Second, it examines the possible role of volatilities of both interest rates and exchanges rates in different industries. Modeling volatilities of interest rates and exchange rates on ADRs of different industries facilitates examining any kind of spillover effects that may exist from interest rates and exchanges rates to ADRs from different industries. Third, unlike previous studies, this study also examines whether there would be any asymmetric impact of positive and negative innovations of the volatility of interest rates and exchange rates on ADR returns of different industries.

3. DATA AND DESCRIPTIVE STATISTICS

To investigate the effects of interest rates and exchange rates on ADR returns from the banking, telecom, and oil & gas sectors, this paper considers stock markets from two emerging markets (Brazil and Hong Kong) and four from developed markets of Europe (U.K., Germany, France, and Italy). However, while collecting data for the ADR prices, we find that data is not available for telecom sector for Italy and thus telecom firms from Italy are eliminated from the analysis.

Following Choi & Kim (2000), we choose the three sectors of banking, telecom, and oil & gas because the banking industry dominates the ADR market, followed by the telecom and oil & gas industries. Many of the ADR firms in the banking sector, telecom, and oil & gas sectors are the bigger firms of their respective countries. They have extensive global operations and the geographical spread influences the operations of the firms. As a result of worldwide operations, these firms require immense amounts of capital, sometimes available only outside the country of origin. ADRs are, therefore, popular among the banking sector, telecom and oil & gas sectors as these firms can

raise capital on both the stock markets in the U.S. as well as their respective home country market.

We examine 14 ADRs from Brazil, 26 from the U.K., 6 from Germany, 9 from France, 2 from Italy and 9 from Hong Kong in the three sectors. Three value-weighted portfolios of ADR stocks from the banking, telecom, and oil & gas sectors for each country are formed. The weights are determined by market capitalization. There are several advantages of forming portfolios for the analysis. First, it helps in condensing substantial amounts of information in an efficient way. Second, the formation of portfolios helps to smooth out noise in the data. Third, portfolios help in dealing with issues related to non-synchronous trading periods for different markets. This is of concern especially when markets do not open at the same time (Karolyi and Stulz, 1996). Fourth, portfolios help to reduce the errors-in-variable problem (Fatemi and Park, 1996).

In addition to the prices of ADRs, we also obtain data for the interest rates and exchange rates. The interest rates used are the 30-day Certificate of Deposit middle rates for Brazil; the 1-month inter-bank rates for Hong Kong and the U.K., and 1-month interbank rates Euro interest rates for the Germany, France and Italy. The exchange rates used are the bilateral spot rates expressed in terms of local currency per U.S. dollar for Brazil, U.K. and Hong Kong. For the European countries the bilateral spot rates of Euros per U.S. dollar is used.

The data used in this paper are the daily closing equity prices for the ADRs, interest rates and exchange rates. All data are obtained from the *DataStream* database. The dataset, which covers the period from January 1, 1999 to December 1, 2004, contains 1,566 observations. Daily percentage returns are calculated for all variables (except interest rates) as 100 (log P_t – log P_{t-1}), where P_t is the value of the index at time t in terms of the local currency. We use the daily data series for this study since weekly returns may be too long to examine the rapid interactions between stock markets (Eun and Shim, 1989; Chowdhry, 1994).

The descriptive statistics for the sample are provided in Tables 1 through Tables 6. Table 1 provides the summary statistics for the returns of the Brazilian banking portfolio (B_BK), Brazilian telecom portfolio (B_TEL), Brazilian oil & gas (B_OIL), Brazilian interest rates (B_INT), and Brazilian exchange rates (B_XR). Table 2 provides the summary statistics for the returns of the U.K. banking portfolio (U_BK), U.K. telecom portfolio (U_TEL), U.K. oil & gas portfolio (U_OIL), U.K. interest rates (U_INT), and U.K. exchange rates (U_XR). Table 3 provides the summary statistics for the returns of the German banking portfolio (G_BK), German telecom portfolio (G_TEL), German oil & gas (G_OIL), German interest rates (G_INT), and German exchange rates (G_XR). Table 4 provides the summary statistics for the returns of the French banking portfolio (F_BK), French telecom portfolio (F_TEL), French oil & gas (F_OIL), French interest rates (F_INT), and French exchange rates (F_XR). Table 5 provides the summary statistics for the returns of the Italian banking portfolio (I_BK), Italian telecom portfolio (I_TEL), Italian oil & gas (I_OIL), Italian interest rates (I_INT), and Italian exchange rates (I_XR). Table

Table 1
Descriptive Statistics of Returns for Brazil

Statistics	B_BK	B_TEL	B_OIL	B_INT	B_XR
Mean	0.0005	-0.0003	0.0006	0.2040	0.0005
Standard Deviation	0.0263	0.0369	0.0937	0.0535	0.0121
Skewness	0.0507	-0.0622	0.2416	2.4364	0.3459
Kurtosis	8.6321	5.4413	42.8400	10.0604	21.6896
LB(12) for $R_{i,t}$	21.69 (0.0410)**	17.45 (0.1340)	125.93 (0.0000)***	16686.00 (0.0000)***	70.29 (0.0000)***
LB(12) for $R^2_{i,t}$	444.90 (0.0000)***	230.24 (0.0000)***	382.55 (0.0000)***	16085.00 (0.0000)***	959.34 (0.0000)***
Jarque-Bera	2070.44 (0.0000)***	389.91 (0.0000)***	103581.70 (0.0000)***	4801.90 (0.0000)***	22823.06 (0.0000)***

Correlation Coefficients

	B_BK	B_TEL	B_OIL	B_INT	B_XR
B_BK	1.0000	0.3765	0.1264	0.0249	-0.3622
B_TEL		1.0000	0.0616	0.0185	-0.2183
B_OIL			1.0000	0.0049	-0.0936
B_INT				1.0000	0.0434
B_XR					1.0000

This table displays the descriptive statistics of returns for Brazil. The variables in the EGARCH model are returns on the value weighted portfolio of Brazilian ADRs in the banking (B_BK), telecom (B_TEL) and oil & gas (B_OIL) sectors. The sample spans the period from January 1, 1999 to December 31, 2004 and contains 1,566 observations. Daily percentage returns ($R_{i,t}$) are calculated as 100 (log P_t – log P_{t-1}), where P_t is the value of the index at time t in terms of the local currency. LB(12) for $R_{i,t}$ is the Ljung-Box statistic, which tests for the presence of autocorrelation, while LB(12) for $R^2_{i,t}$ is the statistic that tests for the presence of heteroscedasticity. The Jarque-Bera statistic tests the null hypothesis of normality. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

Table 2
Descriptive Statistics of Returns for U.K.

Statistics	U_BK	U_TEL	U_OIL	U_INT	U_XR
Mean	0.0002	-0.0001	0.0002	0.0479	-0.0001
Standard Deviation	0.0056	0.0240	0.0143	0.0087	0.0052
Skewness	-0.1356	0.2257	-0.1368	0.1647	0.0467
Kurtosis	5.1706	4.9604	4.9931	1.5759	3.7260
LB(12) for $R_{i,t}$	27.24 (0.0070)***	16.91 (0.1530)	16.81 (0.1570)	18479.00 (0.0000)***	7.25 (-0.841)
LB(12) for $R^2_{i,t}$	288.78 (0.0000)***	263.85 (0.0000)***	301.34 (0.0000)***	18428.00 (0.0000)***	47.67 (0.0000)***
Jarque-Bera	312.21 (0.0000)***	264.08 (0.0000)***	264.09 (0.0000)***	139.40 (0.0000)***	34.96 (0.0000)***

Correlation Coefficients

	U_BK	U_TEL	U_OIL	U_INT	U_XR
U_BK	1.0000	0.3936	0.3274	0.0054	-0.0858
U_TEL		1.0000	0.2577	-0.0163	-0.0345
U_OIL			1.0000	-0.0037	-0.0597
U_INT				1.0000	0.0544
U_XR					1.0000

This table displays the descriptive statistics of returns for U.K. The variables in the model are returns on the value weighted portfolio of U.K. ADRs in the banking (U_BK), telecom (U_TEL) and oil & gas (U_OIL) sectors. The sample spans the period from January 1, 1999 to December 31, 2004 and contains 1,566 observations. Daily percentage returns ($R_{i,t}$) are calculated as 100 (log P_t – log P_{t-1}), where P_t is the value of the index at time t in terms of the local currency. LB(12) for $R_{i,t}$ is the Ljung-Box statistic, which tests for the presence of autocorrelation, while LB(12) for $R^2_{i,t}$ is the statistic that tests for the presence of heteroscedasticity. The Jarque-Bera statistic tests the null hypothesis of normality. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

Table 3
Descriptive Statistics of Returns for Germany

Statistics	G_BK	G_TEL	G_OIL	G_INT	G_XR
Mean	-0.0001	-0.0002	0.0002	0.0319	-0.0001
Standard Deviation	0.0146	0.0302	0.0194	0.0094	0.0063
Skewness	0.3792	0.2685	0.3540	0.4378	-0.2006
Kurtosis	16.6133	6.2944	6.4264	1.9825	3.9441
LB(12) for $R_{i,t}$	35.76 (0.0000)***	18.26 (0.1080)	25.64 (0.0120)**	18648.00 (0.0000)***	5.32 (0.9560)
LB(12) for $R^2_{i,t}$	157.92 (0.0000)***	222.05 (0.0000)***	112.54 (0.0000)***	18646.00 (0.0000)***	14.26 (0.2850)
Jarque-Bera	12129.80 (0.0000)***	726.98 (0.0000)***	798.75 (0.0000)***	117.59 (0.0000)***	68.66 (0.0000)***

Correlation Coefficients

	G_BK	G_TEL	G_OIL	G_INT	G_XR
G_BK	1.0000	0.2288	0.2629	-0.0415	-0.1023
G_TEL		1.0000	0.2844	-0.0650	-0.0220
G_OIL			1.0000	-0.0226	-0.1654
G_INT				1.0000	0.0249
G_XR					1.0000

This table displays the descriptive statistics of returns for Germany. The variables in the model are returns on the value weighted portfolio of German ADRs in the banking (G_BK), telecom (G_TEL) and oil & gas (G_OIL) sectors. The sample spans the period from January 1, 1999 to December 31, 2004 and contains 1,566 observations. Daily percentage returns ($R_{i,t}$) are calculated as 100 ($\log P_t - \log P_{t-1}$), where P_t is the value of the index at time t in terms of the local currency. LB(12) for $R_{i,t}$ is the Ljung-Box statistic, which tests for the presence of autocorrelation, while LB(12) for $R^2_{i,t}$ is the statistic that tests for the presence of heteroscedasticity. The Jarque-Bera statistic tests the null hypothesis of normality. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

Table 4
Descriptive Statistics of Returns for France

Statistics	F_BK	F_TEL	F_OIL	F_INT	F_XR
Mean	0.0010	-0.0006	0.0003	0.0319	-0.0001
Standard Deviation	0.0335	0.0342	0.0132	0.0094	0.0063
Skewness	8.6845	0.3529	-0.2400	0.4378	-0.2009
Kurtosis	221.2240	7.1154	6.1624	1.9825	3.9453
LB(12) for $R_{i,t}$	83.90 (0.0000)***	15.14 (0.2340)	48.36 (0.0000)***	53.49 (0.0000)***	5.32 (0.947)
LB(12) for $R^2_{i,t}$	60.16 (0.0000)***	472.29 (0.0000)***	833.31 (0.0000)***	0.31 (0.0000)***	14.28 (0.283)
Jarque-Bera	3127002.00 (0.0000)***	1137.60 (0.0000)***	667.60 (0.0000)***	117.59 (0.0000)***	68.84 (0.0000)***

Correlation Coefficients

	F_BK	F_TEL	F_OIL	F_INT	F_XR
F_BK	1.0000	0.2067	0.3053	0.0014	0.0179
F_TEL		1.0000	0.3381	-0.0587	0.0041
F_OIL			1.0000	-0.0318	-0.0340
F_INT				1.0000	0.0249
F_XR					1.0000

This table displays the descriptive statistics of returns for France. The variables in the model are returns on the value weighted portfolio of French ADRs in the banking (F_BK), telecom (F_TEL) and oil & gas (F_OIL) sectors. The sample spans the period from January 1, 1999 to December 31, 2004 and contains 1,566 observations. Daily percentage returns ($R_{i,t}$) are calculated as 100 ($\log P_t - \log P_{t-1}$), where P_t is the value of the index at time t in terms of the local currency. LB(12) for $R_{i,t}$ is the Ljung-Box statistic, which tests for the presence of autocorrelation, while LB(12) for $R^2_{i,t}$ is the statistic that tests for the presence of heteroscedasticity. The Jarque-Bera statistic tests the null hypothesis of normality. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

Table 5
Descriptive Statistics of Returns for Italy

Statistics	I_BK	I_OIL	I_INT	I_XR
Mean	-0.0001	0.0004	0.0319	-0.0001
Standard Deviation	0.0238	0.0170	0.0094	0.0063
Skewness	0.1244	0.0672	0.4378	-0.2008
Kurtosis	5.3451	4.8988	1.9825	3.9450
LB(12) for $R_{i,t}$	19.22 (0.0830)*	20.03 (0.0670)***	18648.00 (0.0000)***	5.32 (0.0000)***
LB(12) for $R^2_{i,t}$	389.91 (0.0000)***	140.39 (0.0000)***	18646.00 (0.0000)***	14.28 (0.0000)***
Jarque-Bera	362.88 (0.0000)***	236.42 (0.0000)***	117.59 (0.0000)***	68.79 (0.0000)***

Correlation Coefficients

	I_BK	I_OIL	I_INT	I_XR
I_BK	1.0000	0.3821	-0.0304	0.0112
I_OIL		1.0000	-0.0068	-0.1366
I_INT			1.0000	0.0249
I_XR				1.0000

This table displays the descriptive statistics of returns for Italy. The variables in the model are returns on the value weighted portfolio of Italian ADRs in the banking (I_BK) and oil & gas (I_OIL) sectors. The sample spans the period from January 1, 1999 to December 31, 2004 and contains 1,566 observations. Daily percentage returns ($R_{i,t}$) are calculated as 100 ($\log P_t - \log P_{t-1}$), where P_t is the value of the index at time t in terms of the local currency. LB(12) for $R_{i,t}$ is the Ljung-Box statistic, which tests for the presence of autocorrelation, while LB(12) for $R^2_{i,t}$ is the statistic that tests for the presence of heteroscedasticity. The Jarque-Bera statistic tests the null hypothesis of normality. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

Table 6
Descriptive Statistics of Returns for Hong Kong

Statistics	H_BK	H_TEL	H_OIL	H_INT	H_XR
Mean	0.0005	-0.0011	0.0005	0.0308	0.0000
Standard Deviation	0.0337	0.0181	0.0343	0.0230	0.0003
Skewness	4.3973	-0.0168	-0.2090	0.1943	-8.8586
Kurtosis	373.6634	10.2616	127.8377	1.4369	220.8953
LB(12) for $R_{i,t}$	256.43 (0.0000)***	30.96 (0.0020)***	151.06 (0.0000)***	18455.00 (0.0000)***	86.91 (0.0000)***
LB(12) for $R^2_{i,t}$	337.37 (0.0000)***	669.53 (0.0000)***	380.16 (0.0000)***	18187.00 (0.0000)***	83.26 (0.0000)***
Jarque-Bera	8969832.00 (0.0000)***	3440.72 (0.0000)***	1016897.00 (0.0000)***	169.28 (0.0000)***	3118444.00 (0.0000)***

Correlation Coefficients

	H_BK	H_TEL	H_OIL	H_INT	H_XR
H_BK	1.0000	0.0622	0.0500	-0.0040	-0.0115
H_TEL		1.0000	0.0207	-0.0563	-0.0384
H_OIL			1.0000	-0.0091	-0.0030
H_INT				1.0000	0.0193
H_XR					1.0000

This table displays the descriptive statistics of returns for Hong Kong. The variables in the model are returns on the value weighted portfolio of French ADRs in the banking (F_BK), telecom (F_TEL) and oil & gas (F_OIL) sectors. The sample spans the period from January 1, 1999 to December 31, 2004 and contains 1,566 observations. Daily percentage returns ($R_{i,t}$) are calculated as 100 ($\log P_t - \log P_{t-1}$), where P_t is the value of the index at time t in terms of the local currency. LB(12) for $R_{i,t}$ is the Ljung-Box statistic, which tests for the presence of autocorrelation, while LB(12) for $R^2_{i,t}$ is the statistic that tests for the presence of heteroscedasticity. The Jarque-Bera statistic tests the null hypothesis of normality. The symbols ***, **, and * denote statistical significance at the 1%, 5% and 10% levels respectively.

6 provides the summary statistics for the returns of the Hong Kong banking portfolio (H_BK), Hong Kong telecom portfolio (H_TEL), Hong Kong oil & gas (H_OIL), Hong Kong interest rates (H_INT), and Hong Kong exchange rates (H_XR).

The distribution of returns of the banking, telecom and oil & gas sectors in Brazil, U.K., Germany, France, Italy, and Hong Kong are all skewed. Further, the returns of all portfolios of the six countries are leptokurtotic. The significant values of the Ljung-Box test statistics (LB) for the returns and the square of returns suggest the presence of autocorrelation and heteroscedasticity in the returns series of all the countries. Also, the Jarque-Bera normality test rejects the null hypothesis of normality for all the countries. This is mainly caused by excess kurtosis, indicating that short term returns are characterized more by fat tails than by asymmetry. Clearly, these descriptive statistics indicate that these data fit the ARCH-type modeling approach employed in this study.

4. ECONOMETRIC METHODOLOGY

Following Nelson (1991), researchers such as Koutmos (1996) and Koutmos and Booth (1995) devise the multivariate extension of the EGARCH methodology. Price and volatility spillovers from interest rates and exchange rates to ADR returns in banking, telecom, oil & gas sectors are analyzed using a multivariate extension of the EGARCH methodology. The analysis of the volatility linkages from interest rates and exchange rates to ADR returns in the three sectors is investigated in a one-step estimation procedure, therefore eliminating the need to use estimated regressors.

The multivariate EGARCH is written as follows:

$$R_{i,t} = \beta_{i,0} + \sum_{j=1}^{3} \beta_{i,j} R_{j,t-1} + \beta_{i,4} R_{INT,t-1} + \beta_{i,5} R_{XR,t-1} + \varepsilon_{i,t} \quad (7)$$

Where,

$i, j = 1, 2, 3$ and $\boldsymbol{\varepsilon}_{i,t} \sim N(0, \sigma^2 i, t)$

The daily returns are expressed as:

$R_{i,t} = \mu_{i,t} + \varepsilon_{i,t}$ for sector i,

Where:

$\mu_{i,t} = E(R_{i,t} / \Omega_{t-1})$ is the conditional mean of returns at time *t*, based on information available at time *t-1*,

$\varepsilon_{i,t}$ is the innovation at time *t* and *i, j* = 1,2,.3 (where 1 = banking portfolio, 2 = telecom portfolio, 3 = oil & gas portfolio).

The above equation describes returns as a Vector Autoregressive (VAR) model where the conditional mean in each market is a function of its own past returns and cross-market past returns. The coefficient $\beta_{i,j}$ measures the extent of relationships between the variables. A significant $\beta_{i,j}$, $i = j$, implies that the returns of the ADR portfolio for each sector from the respective country are dependent on their past values. Coefficients $\beta_{i,j}$, $i \neq j$ measure the extent of price spillover between the variables. A significant $\beta_{i,j}$ would imply that market *j* leads market *i*, or equivalently, that current returns in market *j* can be used to predict future returns in market *i*. A significant $\beta_{i,4}$ and $\beta_{i,5}$ implies that price spillovers exist from interest rates and exchange rates across the returns of each of the ADR portfolios.

The conditional variance between the markets, given by equation (8), is an exponential function of past own innovations as well as cross-market standardized innovations.

$$\sigma_{i,t}^2 = \exp[\alpha_{i,0} + \sum_{j=1}^{3} \alpha_{i,j} f_j(z_{j,t-1}) + \gamma_i \ln(\sigma_{i,t-1}^2) + \alpha_{i,4} R_{INT,t} + \alpha_{i,5} R_{XR,t}] \quad (8)$$

Where:

$\sigma_{i,t}^2$ is the conditional variance,

$Z_{j,t-1}$ is the standardized innovation at time *t*-1
(i.e., $Z_{i,t-1} = \varepsilon_{i,t-1} / \sigma_{i,t-1}$)

In the above equation, the coefficient $\alpha_{i,j}$ captures the effect of innovations from variable *j* to variable *i*. Significant parameter values of $\alpha_{i,j}$, $i = j$, indicate that volatilities in each market are dependent on their past innovations. Coefficients $\alpha_{i,j}$ $i \neq j$ measure the extent of volatility spillover between the markets. A significant $\alpha_{i,4}$ and $\alpha_{i,5}$ implies that volatility spillovers exist from interest rates and exchange rates across the returns of banking, telecom and oil & gas ADR portfolios.

The particular functional form $f_j(Z_{j,t-1})$ given in equation (9) is an asymmetric function of past standardized innovations.

$$f_j(Z_{j,t-1}) = (|Z_{j,t-1}| - E(|Z_{j,t-1}|)) + \delta_j Z_{j,t-1} \text{ for } j = 1,2,3 \quad (9)$$

The coefficient γ_i measures volatility persistence. The unconditional variance is finite if $\gamma_i < 1$. If $\gamma_i = 1$ then the unconditional variance does not exist and the conditional variance follows an integrated process of order one. Asymmetry in volatility transmission is modeled by equation (9) and can be examined using its derivatives:

$$\partial f_j(z_{jt}) / \partial z_{jt} = \left\{1 + \delta_j, for \quad z_j > 0\right\}$$

$$\left\{-1 + \delta_j, for \quad z_j < 0\right\} \quad (10)$$

The term $|Z_{j,t-1}| - E(|Z_{j,t-1}|)$ measures the magnitude effect while the term $\delta_j Z_{j,t-1}$ measures the sign effect. In the event that market advances and market declines impact volatility symmetrically, then the coefficient of δ_i would not

be significant. However, if declines in market j ($Z_{j,t-1} < 0$) are followed by higher (lower) volatility than the advances in market ($Z_{j,t-1} > 0$), then δ_j would be negative (positive) and significant. In summary, a significant positive $\alpha_{i,j}$ coupled with a negative δ_i implies that negative innovations in market j have a higher impact on the volatility of market i, than positive innovations, i.e. the volatility transmission is asymmetric.

Equation (11) provides the conditional covariance that captures the contemporaneous relationship between returns of the two markets.

$$\sigma_{i,j,t} = \rho_{i,j}\sigma_{i,t}\sigma_{j,t} \text{ for } i, j = 1, 2, 3 \;\; i \neq j; \qquad (11)$$

Where:

$\sigma_{i,j,t}$ is the conditional covariance between markets i and j at time t.

This specification implies that the covariance is proportional to the product of the standard deviations (Bollerslev, 1990). The coefficient $\rho_{i,j}$ is the cross-market correlation coefficient between the volatilities of the two markets. Statistically significant estimates of $\rho_{i,j}$ indicate that time-varying volatilities across markets i and j are correlated over time (Racine and Ackert, 1998). This assumption greatly simplifies the estimation of the model (Bollerslev and Wooldridge, 1992).

The multivariate EGARCH model is estimated using the following log likelihood function:

$$L(\theta) = -(1/2)(NT)\ln(2\pi) - (1/2)\sum_{t=1}^{T}(\ln|H_t| + \varepsilon_t' H_t^{-1}\varepsilon_t) \qquad (12)$$

Where:

θ is the parameter vector to be estimated;
N is the number of equations;
T is the number of observations.
ε_t is a vector of innovations at time t;

H_t is the time-varying conditional variance-covariance matrix with diagonal elements given by equation (8) and cross-diagonal elements given by equation (11).

The log likelihood function under equation (12) is highly nonlinear in θ and therefore the numerical maximization algorithm technique of Berndt, Hall, Hall and Hausman (1974) is used to maximize $L(\theta)$.

Table 7
Maximum Likelihood Estimates of the EGARCH model for Brazil

	B_BK			B_TEL			B_OIL	
Price spillover parameters								
β_{10}	-0.0004	(0.0035)	β_{20}	0.0251	(0.0018)***	β_{30}	0.0123	(0.0005)***
β_{11}	-0.0653	(0.0248)***	β_{21}	-0.0464	(0.0071)***	β_{31}	-0.0138	(0.0046)**
β_{12}	0.0006	(0.0127)	β_{22}	0.0442	(0.0260)**	β_{32}	-0.0060	(0.0020)**
β_{13}	0.0010	(0.0170)	β_{23}	-0.0721	(0.0062)***	β_{33}	0.9302	(0.0023)***
β_{14}	-0.3732	(0.0704)***	β_{24}	0.0366	(0.0483)	β_{34}	0.0910	(0.0022)***
β_{15}	0.0241	(0.0276)	β_{25}	-0.0346	(0.0208)*	β_{35}	-0.0710	(0.0063)**
Volatility spillover parameters								
α_{10}	-0.4404	(0.0827)***	α_{20}	-0.9006	(0.0244)***	α_{30}	-10.0491	(0.0791)***
α_{11}	0.1177	(0.014)***	α_{21}	-0.1418	(0.0156)***	α_{31}	0.3027	(0.0257)***
α_{12}	0.0810	(0.0216)***	α_{22}	0.6109	(0.0237)***	α_{32}	0.0524	(0.0269)**
α_{13}	0.0194	(0.0130)	α_{23}	-0.6157	(0.0176)***	α_{33}	0.6576	(0.0242)***
α_{14}	0.1792	(0.0338)***	α_{24}	0.7824	(0.0423)***	α_{34}	-0.0946	(0.0286)***
α_{15}	0.0048	(0.0061)	α_{25}	0.1309	(0.0054)***	α_{35}	0.0410	(0.0093)***
Other parameters								
γ_1	0.9304	(0.0130)***	γ_2	0.8310	(0.0052)***	γ_3	-0.1275	(0.0090)***
δ_1	-0.2399	(0.0589)***	δ_2	-0.3827	(0.0169)***	δ_3	-0.1383	(0.0157)***
Correlation Matrix								
	B_BK			B_TEL			B_OIL	
B_BK	1.0000			0.2017	(0.1123)*		-0.0284	(0.0296)
B_TEL				1.0000			0.0067	(0.0613)
B_OIL							1.0000	

This table displays the maximum likelihood estimates of the EGARCH model for Brazil. The variables in the model are returns on the value weighted portfolio of Brazilian ADRs in the banking (B_BK), telecom (B_TEL) and oil & gas (B_OIL) sectors. The EGARCH model is estimated based on Eqs. (1)-(3):

$R_{i,t} = \beta_{i,0} + \sum_{j=1}^{3}\beta_{i,j}R_{j,t-1} + \beta_{i,3}R_{INT,t-1} + \beta_{i,4}R_{XRt-1} + \varepsilon_{i,t}$;

$\sigma_{i,t}^2 = \exp[\alpha_{i,0} + \sum_{j=1}^{3}\alpha_{i,j}f_j(z_{j,t-1}) + \gamma_i \ln(\sigma_{i,t-1}^2) + \alpha_{i,3}R_{INT,t} + \alpha_{i,4}R_{XRt}]$ and

$f_j(Z_{j,t-1}) = (|Z_{j,t-1}| - E(|Z_{j,t-1}|)) + \delta_j Z_{j,t-1}$ for i,j=1,2 and where $R_{i,t}$ is the daily percentage return for sector i at time t, $R_{j,t-1}$ is the daily percentage return for sector j at time t-1 and $z_{j,t-1}$ is the standardized innovation at time t-1. The parameters $\beta_{i,j}$ reflect the extent of price spillovers, $\beta_{i,3}$ and $\beta_{i,4}$ the price spillover from interest rates and exchange rates, $\alpha_{i,j}$ captures volatility spillovers, $\alpha_{i,3}$ and $\alpha_{i,4}$ the extent of volatility spillovers from interest rates and exchange rates, γ_i measures the persistence of volatility and δ_i captures the asymmetric impact of volatility. ***, **, and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in parenthesis are robust standard errors.

5. RESULTS

The maximum likelihood estimates of the multivariate EGARCH model for all ADR portfolios are reported from Tables 7 through 12. The detailed results of each portfolio are presented below.

Brazilian ADR portfolios

Table 7 presents the price and volatility spillovers from Brazilian interest rates and exchange rates to banking, telecom and oil & gas portfolios of Brazilian ADR returns. First, price and volatility spillovers exist from interest rates to banking sector ADR returns. However, there are no significant price or volatility spillovers from exchange rates to the banking sector. Second, there are no significant price spillovers but volatility spillovers are there from interest rates to the telecom sector. Further, both price and volatility spillovers exist from exchange rates to the telecom sector. Third, there is evidence of price and volatility spillovers from interest rates and exchange rates to the oil & gas sector. Lastly, the Brazilian ADRs in all three sectors are strongly influenced by their own past innovations in both the first and second moments.

In Brazil, we find insignificant results for the price and volatility spillovers from the exchange rates to the banking sector. This can be attributed this to the fact that Brazilian banks are mainly owned by powerful multi-company firms called "grupos" (Makler, 2001; Sargent, 2001; Carrera et. al., 2003). These grupo banks are set up basically for raising capital from outside members of the group. Since these grupo banks raise funds internally within Brazil, we find insignificant effects of spillovers of exchange rates on the banking ADR portfolio

but significant effects of interest rate spillovers to the banking sector.

Further, there are mixed evidences for the spillovers from interest rates to the telecom sector and significant spillovers from exchange rates to the telecom sector. This can perhaps be attributed to the fact that a large portion of the telecom sector ADR portfolio consists of cellular phone companies. The cellular market has recently opened up with most of the equipment used by these firms being imported from the U.S. or Europe. Additionally, these firms tend to raise capital not only from Brazil but also outside Brazil.

For the oil & gas ADR portfolio, spillovers from both the interest and exchange rates are statistically significant. This may be because oil & gas is a capital intensive industry and Brazil imports most of the products and services from outside the country.

U.K. ADR portfolios

Table 8 summarizes the maximum likelihood estimates of the EGARCH model for U.K. ADRs. Results show price and volatility spillovers from interest rates and exchange rates to banking, telecom and oil & gas sector ADR portfolios. Further, the U.K. ADR portfolios in all three sectors are strongly influenced by their own past innovations in both the first and second moments.

We find significant volatility spillovers from interest rate to the U.K. banking, telecom, and oil & gas ADR portfolios. This is consistent with the fact that the interest rates in the U.K. are driven by the Bank of England and hence we find significant spillover effects. Similar results are documented by Wong (1990) who finds significant effects of monetary policies of the U.K. on the stock returns. This dissertation contributes to the literature by finding significant spillovers from interest rates to the ADR portfolios.

German ADR portfolios

Table 9 indicates that there is mixed evidence of spillovers from interest rates and exchange rates. There is evidence if price spillovers exist from interest rates to only the oil & gas sector and none to the banking and telecom sector ADR portfolios. However, there is evidence of price spillovers from exchange rates to both ADR portfolios of the banking and oil & gas sectors. In terms of volatility, spillovers exist from interest rates to the banking and oil & gas sector ADR portfolios and from exchange rates to the banking, telecom and oil & gas sector ADR portfolios.

In Germany, there are statistically insignificant spillovers from interest rates to the telecom sector ADR portfolio. This can be attributed to the fact that due to the formation of the European Union, the returns of the telecom firms also depend on the competition against these telecom firms in the same industry (Karolyi & Stulz (1996) and Choi and Kim (2000)).

French ADR portfolios

Table 10 presents the price and volatility spillovers from French interest rates and exchange rates to the banking, telecom and oil & gas sector ADR portfolios from France. In terms of price spillovers, it can be seen that interest rates spillover to the banking, telecom, and oil & gas sector ADRs. However, exchange rates spillover to only the banking and oil & gas sector ADR portfolios. In terms of volatility, spillovers exist from interest rates to banking and telecom sector ADRs and from exchange rates to all three sectors considered. Further, the French ADR portfolios in all three sectors are strongly influenced by their own past innovations in both the first and second moments.

The insignificant spillovers from interest rates to the oil & gas sectors can be attributed to the extensive imports of the products and services from outside the country.

Italian ADR portfolios

With regards to price spillovers, Table 11 presents evidence of interest rates and exchange rates spillover to banking and oil

Table 8
Maximum Likelihood Estimates of the EGARCH model for U.K.

	U_BK		U_TEL		U_OIL	
Price spillover parameters						
β_{10}	0.0090	(0.0000)****	0.0050	(0.0000)****	-0.0007	(0.0000)****
β_{11}	-0.0121	(0.0000)****	0.0380	(0.0000)****	-0.0023	(0.0000)****
β_{12}	-0.0036	(0.0000)****	0.0262	(0.0000)****	-0.0107	(0.0000)****
β_{13}	0.0192	(0.0000)****	0.0277	(0.0000)****	1.0123	(0.0004)****
β_{14}	0.1450	(0.0000)****	0.1428	(0.0000)****	-0.0090	(0.0000)****
β_{15}	0.0571	(0.0000)****	0.0973	(0.0000)****	-0.0080	(0.0000)****
Volatility spillover parameters						
α_{10}	-5.4403	(0.0000)****	-6.3667	(0.0000)****	-14.1932	(0.0135)****
α_{11}	2.1245	(0.0000)****	0.1832	(0.0000)****	0.7025	(0.0000)****
α_{12}	0.3810	(0.0000)****	1.9538	(0.0000)****	1.6741	(0.0000)****
α_{13}	0.1496	(0.0000)****	-0.5010	(0.0000)****	0.6376	(0.0000)****
α_{14}	0.1829	(0.0000)****	0.0025	(0.0000)****	-0.3691	(0.0000)****
α_{15}	0.1052	(0.0000)****	0.0380	(0.0000)****	-0.0440	(0.0000)****
Other parameters						
γ_1	0.0892	(0.0000)****	0.1509	(0.0000)****	-0.1336	(0.0000)****
δ_1	-0.0956	(0.0000)****	-0.0362	(0.0000)****	-0.4092	(0.0000)****
Correlation Matrix						
	U_BK		U_TEL		U_OIL	
U_BK	1.0000		0.0597	(0.0000)****	-0.4425	(0.0000)****
U_TEL			1.0000		-0.4660	(0.0000)****
U_OIL					1.0000	

This table displays the maximum likelihood estimates of the EGARCH model for U.K.. The variables in the model are returns on the value weighted portfolio of U.K. ADRs in the banking (U_BK), telecom (U_TEL) and oil & gas (U_OIL) sectors. The EGARCH model is estimated based on Eqs. (1)-(3):

$$R_{i,t} = \beta_{i,0} + \sum_{j=1}^{3} \beta_{i,j} R_{j,t-1} + \beta_{i,3} R_{INT,t-1} + \beta_{i,4} R_{XR,t-1} + \varepsilon_{i,t};$$

$$\sigma^2_{i,t} = \exp[\alpha_{i,0} + \sum_{j=1}^{3} \alpha_{i,j} f_j(z_{j,t-1}) + \gamma_i \ln(\sigma^2_{i,t-1}) + \alpha_{i,3} R_{INT,t} + \alpha_{i,4} R_{XR,t}] \text{ and}$$

$f_j(Z_{j,t-1}) = (|Z_{j,t-1}| - E(|Z_{j,t-1}|)) + \delta_j Z_{j,t-1}$ for i,j=1,2 and where $R_{i,t}$ is the daily percentage return for sector i at time t, $R_{j,t-1}$ is the daily percentage return for sector j at time t-1 and $z_{j,t-1}$ is the standardized innovation at time t-1. The parameters $\beta_{i,j}$ reflect the extent of price spillovers, $\beta_{i,3}$ and $\beta_{i,4}$ the price spillover from interest rates and exchange rates, $\alpha_{i,j}$ captures volatility spillovers, $\alpha_{i,3}$ and $\alpha_{i,4}$ the extent of volatility spillovers from interest rates and exchange rates, γ_i measures the persistence of volatility and δ_i captures the asymmetric impact of volatility. ***, **, and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in parenthesis are robust standard errors.

Table 9
Maximum Likelihood Estimates of the EGARCH model for Germany

	G_BK			G_TEL			G_OIL	
Price spillover parameters								
β_{10}	0.0099	(0.0021)***	β_{20}	0.0467	(0.0018)***	β_{30}	0.0045	(0.0002)***
β_{11}	0.0258	(0.0257)	β_{21}	0.0476	(0.0025)***	β_{31}	0.0099	(0.0008)***
β_{12}	0.0449	(0.0449)**	β_{22}	-0.0131	-0.0175	β_{32}	0.0083	(0.0017)***
β_{13}	0.0614	(0.0614)	β_{23}	0.1205	(0.0533)**	β_{33}	0.8254	(0.009)***
β_{14}	0.1019	(0.1018)	β_{24}	0.0405	(0.0491)	β_{34}	0.0199	(0.0004)***
β_{15}	0.0618	(0.0618)*	β_{25}	0.0530	(0.0341)	β_{35}	0.0201	(0.0028)***
Volatility spillover parameters								
α_{10}	-1.1238	(0.2665)***	α_{20}	-2.0845	(0.2894)***	α_{30}	-5.5644	(0.3144)***
α_{11}	4.6959	(0.2469)***	α_{21}	0.0295	(0.0265)	α_{31}	-0.1416	(0.0420)***
α_{12}	0.0367	(0.0813)	α_{22}	5.1258	(0.3222)***	α_{32}	0.2173	(0.0884)**
α_{13}	0.1419	(0.0556)**	α_{23}	-0.0031	(0.0011)***	α_{33}	0.1458	(0.0426)***
α_{14}	0.1225	(0.0739)*	α_{24}	0.0441	(0.0432)	α_{34}	-0.1182	(0.0221)***
α_{15}	0.0172	(0.0015)***	α_{25}	0.0197	(0.0099)**	α_{35}	0.0318	(0.0060)***
Other parameters								
γ_1	0.2955	(0.0242)***	γ_2	0.1897	(0.0117)***	γ_3	0.5436	(0.0273)***
δ_1	-0.0827	(0.0054)***	δ_2	-0.1588	(0.0521)***	δ_3	-1.0971	(0.4603)**
Correlation Matrix								

	G_BK		G_TEL		G_OIL	
G_BK	1.0000		0.3902	(0.0725)***	-0.4787	(0.1268)***
G_TEL			1.0000		0.3479	(0.0000)***
G_OIL					1.0000	

This table displays the maximum likelihood estimates of the EGARCH model for Germany. The variables in the model are returns on the value weighted portfolio of German ADRs in the banking (G_BK), telecom (G_TEL) and oil & gas (G_OIL) sectors. The EGARCH model is estimated based on Eqs. (1)-(3):

$$R_{i,t} = \beta_{i,0} + \sum_{j=1}^{3} \beta_{i,j} R_{j,t-1} + \beta_{i,3} R_{INT,t-1} + \beta_{i,4} R_{XRt-1} + \varepsilon_{i,t};$$

$$\sigma^2_{i,t} = \exp[\alpha_{i,0} + \sum_{j=1}^{3} \alpha_{i,j} f_j(z_{j,t-1}) + \gamma_i \ln(\sigma^2_{i,t-1}) + \alpha_{i,3} R_{INT,t} + \alpha_{i,4} R_{XRt}] \text{ and}$$

$$f_j(Z_{j,t-1}) = (|Z_{j,t-1}| - E(|Z_{j,t-1}|)) + \delta_j Z_{j,t-1} \text{ for } i,j=1,2 \text{ and where } R_{i,t} \text{ is the daily percentage return for sector } i \text{ at time } t, R_{j,t-1} \text{ is the daily percentage return for sector } j \text{ at time } t\text{-}1 \text{ and } z_{j,t-1} \text{ is the standardized innovation at time } t\text{-}1. \text{ The parameters } \beta_{i,j} \text{ reflect the extent of price spillovers, } \beta_{i,3} \text{ and } \beta_{i,4} \text{ the price spillover from interest rates and exchange rates, } \alpha_{i,j} \text{ captures volatility spillovers, } \alpha_{i,3} \text{ and } \alpha_{i,4} \text{ the extent of volatility spillovers from interest rates and exchange rates, } \gamma_i \text{ measures the persistence of volatility and } \delta_i \text{ captures the asymmetric impact of volatility. ***, **, and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in parenthesis are robust standard errors.}$$

Table 10
Maximum Likelihood Estimates of the EGARCH model for France

	F_BK			F_TEL			F_OIL	
Price spillover parameters								
β_{10}	0.0044	(0.0018)*	β_{20}	-0.0002	(0.0007)	β_{30}	0.0006	(0.0000)***
β_{11}	0.0733	(0.0206)***	β_{21}	0.0258	(0.0092)**	β_{31}	0.0003	(0.0002)
β_{12}	0.0423	(0.0325)	β_{22}	0.0311	(0.0185)*	β_{32}	0.0028	(0.0010)**
β_{13}	0.1421	(0.0544)**	β_{23}	0.0589	(0.0268)**	β_{33}	0.9794	(0.0015)***
β_{14}	0.1953	(0.0677)**	β_{24}	0.1410	(0.0353)***	β_{34}	-0.0069	(0.0000)***
β_{15}	0.1129	(0.0164)***	β_{25}	0.0090	(0.0108)	β_{35}	0.0048	(0.0006)***
Volatility spillover parameters								
α_{10}	-5.0048	(0.1887)***	α_{20}	-0.9072	(0.1087)***	α_{30}	-11.8839	(0.0596)***
α_{11}	1.2324	(0.0603)***	α_{21}	0.2102	(0.0309)***	α_{31}	-0.6080	(0.0442)***
α_{12}	-0.0213	(0.013)	α_{22}	0.0114	(0.0062)*	α_{32}	0.0492	(0.0253)**
α_{13}	-0.2035	(0.0221)***	α_{23}	0.0344	(0.0121)**	α_{33}	0.7449	(0.0573)***
α_{14}	0.6412	(0.0951)***	α_{24}	-0.1429	(0.0259)***	α_{34}	-0.0158	(0.1148)
α_{15}	0.0207	(0.0058)***	α_{25}	-0.0046	(0.0024)*	α_{35}	0.0341	(0.0079)***
Other parameters								
γ_1	0.2568	(0.0279)***	γ_2	0.8980	(0.0122)***	γ_3	0.1629	(0.0027)***
δ_1	-0.1176	(0.0329)***	δ_2	-3.7122	(2.1316)*	δ_3	-1.0267	(0.0742)***
Correlation Matrix								

	F_BK		F_TEL		F_OIL	
F_BK	1.0000		0.4493	(0.2696)*	0.1400	(0.0558)
F_TEL			1.0000		0.1186	(0.0530)
F_OIL					1.0000	

This table displays the maximum likelihood estimates of the EGARCH model for France. The variables in the model are returns on the value weighted portfolio of French ADRs in the banking (F_BK), telecom (F_TEL) and oil & gas (F_OIL) sectors. The EGARCH model is estimated based on Eqs. (1)-(3):

$$R_{i,t} = \beta_{i,0} + \sum_{j=1}^{3} \beta_{i,j} R_{j,t-1} + \beta_{i,3} R_{INT,t-1} + \beta_{i,4} R_{XRt-1} + \varepsilon_{i,t};$$

$$\sigma^2_{i,t} = \exp[\alpha_{i,0} + \sum_{j=1}^{3} \alpha_{i,j} f_j(z_{j,t-1}) + \gamma_i \ln(\sigma^2_{i,t-1}) + \alpha_{i,3} R_{INT,t} + \alpha_{i,4} R_{XRt}] \text{ and}$$

$$f_j(Z_{j,t-1}) = (|Z_{j,t-1}| - E(|Z_{j,t-1}|)) + \delta_j Z_{j,t-1} \text{ for } i,j=1,2 \text{ and where } R_{i,t} \text{ is the daily percentage return for sector } i \text{ at time } t, R_{j,t-1} \text{ is the daily percentage return for sector } j \text{ at time } t\text{-}1 \text{ and } z_{j,t-1} \text{ is the standardized innovation at time } t\text{-}1. \text{ The parameters } \beta_{i,j} \text{ reflect the extent of price spillovers, } \beta_{i,3} \text{ and } \beta_{i,4} \text{ the price spillover from interest rates and exchange rates, } \alpha_{i,j} \text{ captures volatility spillovers, } \alpha_{i,3} \text{ and } \alpha_{i,4} \text{ the extent of volatility spillovers from interest rates and exchange rates, } \gamma_i \text{ measures the persistence of volatility and } \delta_i \text{ captures the asymmetric impact of volatility. ***, **, and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in parenthesis are robust standard errors.}$$

& gas ADR sector portfolios. In terms of volatility, spillovers exist from interest rates to both banking and oil & gas sector portfolios and from exchange rates to oil & gas sector ADR portfolios. Recall that data limitations preclude the formation of the telecom sector portfolio from Italy.

European region

The discussions of the results for the European region are described in this section. In Europe, most of the banks from the U.K., Germany, France, and Italy are international banks. Hence there are significant spillovers from exchange rates to the banking ADR portfolio. However, in Italy the international bank included in the analysis has had heavy losses in the last few years with its entire net worth eroded. This has perhaps impacted the findings resulting in mixed evidence for spillovers from exchange rates.

Regarding the ADRs in the telecom sector, the U.K. portfolio is a mixed portfolio consisting of both international and domestic firms while the German and French portfolios are dominated by international firms with global operations. Hence, there is mixed evidence for spillovers from interest rates to the telecom sector ADR portfolio. For the oil & gas ADR portfolio, spillovers from both the interest rates and exchange rates are statistically significant. This is due to the fact that oil & gas industry imports most of the products and services from outside the country.

Hong Kong ADR portfolios

There is substantial evidence of lead-lag relationships for the Hong Kong ADR portfolios from the banking, telecom, and oil & gas sectors as shown in Table 12 which summarizes the maximum likelihood estimates of the EGARCH model for Hong Kong. There are price spillovers from interest rates and exchange rates to the three sectors considered. In addition, there exist volatility spillovers from interest rates and exchange rates to all three sector ADR portfolios. Lastly, the Hong Kong ADR portfolios in all the three sectors are strongly influenced by their own past innovations in both the first and second moments.

For Hong Kong, the significant results of spillovers from interest rates and exchange rates to the banking, telecom, and oil & gas ADR portfolios can be attributed to the fact that Hong Kong is an open market providing greater access to foreign investors. Also, the firms that constitute the ADR portfolio are all international firms with global operations. Therefore, emerging markets that are more open to foreign investors are to a greater extent influenced by other developed markets. Therefore, we find statistically significant spillovers for Hong Kong for all the three ADR sector portfolios.

Volatility persistence and asymmetric volatility spillover effect

The values of volatility persistence are given in Tables 7 through 12. The values of γ_i indicate volatility persistence and should be significant and less than one if there is persistence. In this paper, all the values of γ_i are significant and less than one. If volatility shocks persist indefinitely, then it is likely to move

the whole term structure of risk premiums (Nelson, 1991) and consequently will also have a significant impact on investment in long-lived capital goods (Poterba and Summers, 1986).

For Brazil and U.K. ADR portfolios, persistence is highest in the banking sector followed by the telecom and oil & gas sectors. For Germany, ADRs persistence is highest in the oil & gas sectors followed by that of the banking and telecom sector portfolios. For France, ADRs persistence is highest in the telecom sector, followed by banking and oil & gas sector portfolios, while for Italy persistence is highest in banking followed by oil & gas sectors.

Asymmetry in volatility transmission is modeled by equation (3). Tables 7 through 12 indicate that the coefficients of asymmetry, δ_j, are negative and significant for interest rates and exchange rates of all three ADR portfolios from Brazil, U.K., Germany, France and Italy. This finding implies that for Brazil, U.K., Germany, France and Italy, negative innovations for both interest and exchange rates, increase volatility more than positive innovations do. These findings suggest that these markets are more sensitive to negative innovations originating from other markets than to positive innovations.

This finding has important implications for portfolio managers. Portfolio managers need to have a proper understanding of how markets are interrelated in order to develop effective hedging strategies against shocks that are propagated across different sectors in different markets. Additionally, they may also want to rebalance their portfolios from one sector to another and also from one market to another. The risk reduction will largely depend on the extent of volatility transmission across the different markets. Further, required if a monetary institution wants to change interest rates and exchange rates, a proper understanding of how unexpected changes in interest rates and exchange rates are transmitted across different sectors of a market is required.

Overall, the results suggest that there are price and volatility spillovers from interest rates as well as exchange rates to the ADR portfolios from the banking, telecom and oil & gas sectors. The results also suggest that negative innovations in interest rates as well as exchange rates affect volatility more than positive innovations in all three industry portfolios. These findings suggest that the banking, telecom, and oil & gas sectors are more sensitive to negative innovations originating from other markets than to positive innovations. Given these findings, we conclude that volatility plays an important role in determining ADR returns and thus limits the benefits of international diversification using ADRs.

Diagnostics tests

Tables 13 and 14 report the residual based diagnostics tests. Developed by Engle and Ng (1993), these tests facilitate a check of whether the model is correctly specified. The asymmetry tests statistics - the sign bias, negative size, positive size, and joint tests – all show that there is no serial correlation in the standardized residuals. Thus we conclude that the model is correctly specified.

Table 11
Maximum Likelihood Estimates of the EGARCH model for Italy

	I_BK			I_OIL	
Price spillover parameters					
β_{10}	0.0032	(0.0003)***	β_{20}	0.0007	(0.0000)***
β_{11}	0.1316	(0.0121)***	β_{21}	0.0080	(0.0005)***
β_{12}	-0.0579	(0.0105)***	β_{22}	0.9797	(0.0011)***
β_{13}	0.0431	(0.0188)**	β_{23}	0.0154	(0.0000)***
β_{14}	0.0494	(0.0043)***	β_{24}	-0.0025	(0.0004)***
Volatility spillover parameters					
α_{10}	-3.0633	(0.1298)***	α_{20}	-9.1928	(0.3614)***
α_{11}	2.0574	(0.0536)***	α_{21}	0.5435	(0.0391)***
α_{12}	0.2310	0.02569)***	α_{22}	1.3863	(0.0441)***
α_{13}	0.3416	(0.0677)***	α_{23}	0.1255	(0.0762)*
α_{14}	-0.0002	(0.0028)	α_{24}	0.0824	(0.0049)***
Other parameters					
γ_1	0.5738	(0.0162)***	γ_2	0.3416	(0.0254)***
δ_1	-0.3694	(0.0130)***	δ_2	-0.2947	(0.0263)***
Correlation Matrix					
	I_BK			I_OIL	
I_BK	1.0000			0.3479	(0.0496)***
I_OIL				1.0000	

This table displays the maximum likelihood estimates of the EGARCH model for Italy. The variables in the model are returns on the value weighted portfolio of Italian ADRs in the banking (I_BK) and oil & gas (I_OIL) sectors. The EGARCH model is estimated based on Eqs. (1)-(3): $R_{i,t} = \beta_{i,0} + \sum_{j=1}^{2} \beta_{i,j} R_{j,t-1} + \beta_{i,3} R_{INT,t-1} + \beta_{i,4} R_{XRt-1} + \varepsilon_{i,t}$;

$\sigma^2_{i,t} = \exp[\alpha_{i,0} + \sum_{j=1}^{2} \alpha_{i,j} f_j(z_{j,t-1}) + \gamma_i \ln(\sigma^2_{i,t-1}) + \alpha_{i,3} R_{INT,t} + \alpha_{i,4} R_{XRt}]$ and

$f_j(Z_{j,t-1}) = (|Z_{j,t-1}| - E(|Z_{j,t-1}|)) + \delta_j Z_{j,t-1}$ for i,j=1,2 and where $R_{i,t}$ is the daily percentage return for market i at time t, $R_{j,t-1}$ is the daily percentage return for market j at time t-1 and $z_{j,t-1}$ is the standardized innovation at time t-1. The parameters $\beta_{i,j}$ reflect the extent of price spillovers, $\beta_{i,3}$ and $\beta_{i,4}$ the price spillover from interest rates and exchange rates, $\alpha_{i,j}$ captures volatility spillovers, $\alpha_{i,3}$ and $\alpha_{i,4}$ the extent of volatility spillovers from interest rates and exchange rates, γ_i measures the persistence of volatility and δ_i captures the asymmetric impact of volatility. ***, **, and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in parenthesis are robust standard errors.

Table 12
Maximum Likelihood Estimates of the EGARCH model for Hong Kong

	H_BK			H_TEL			H_OIL	
Price spillover parameters								
β_{10}	0.01	(0.0000)***	β_{20}	0.1	(0.0000)***	β_{30}	0.01	(0.0000)***
β_{11}	0.01	(0.0000)***	β_{21}	0.05	(0.0000)***	β_{31}	0.05	(0.0000)***
β_{12}	0.05	(0.0000)***	β_{22}	0.01	(0.0000)***	β_{32}	0.05	(0.0000)***
β_{13}	0.05	(0.0000)***	β_{23}	0.05	(0.0000)***	β_{33}	0.01	(0.0000)***
β_{14}	0.05	(0.0000)***	β_{24}	0.05	(0.0000)***	β_{34}	0.05	(0.0000)***
β_{15}	0.05	(0.0000)***	β_{25}	0.05	(0.0000)***	β_{35}	0.05	(0.0000)***
Volatility spillover parameters								
α_{10}	0.01	(0.0000)***	α_{20}	0.01	(0.0000)***	α_{30}	0.05	(0.0000)***
α_{11}	0.5	(0.0000)***	α_{21}	0.05	(0.0000)***	α_{31}	0.05	(0.0000)***
α_{12}	0.05	(0.0000)***	α_{22}	0.5	(0.0000)***	α_{32}	0.5	(0.0000)***
α_{13}	0.05	(0.0000)***	α_{23}	0.05	(0.0000)***	α_{33}	0.05	(0.0000)***
α_{14}	0.05	(0.0000)***	α_{24}	0.05	(0.0000)***	α_{34}	0.05	(0.0000)***
α_{15}	0.05	(0.0000)***	α_{25}	0.045	(0.0000)***	α_{35}	-0.0247	(0.0000)***
Other parameters								
γ_1	0.1000	(0.0000)***	γ_2	0.1000	(0.0000)***	γ_3	0.1000	(0.0000)***
δ_1	0.1000	(0.0000)***	δ_2	0.1000	(0.0000)***	δ_3	0.1000	(0.0000)***
Correlation Matrix								
	H_BK			H_TEL			H_OIL	
H_BK	1.0000			0.14958	(0.0000)***		0.0500	(0.0000)***
H_TEL				1.0000			0.0500	(0.0000)***
H_OIL							1.0000	

This table displays the maximum likelihood estimates of the EGARCH model for France. The variables in the model are returns on the value weighted portfolio of French ADRs in the banking (F_BK), telecom (F_TEL) and oil & gas (F_OIL) sectors. The EGARCH model is estimated based on Eqs. (1)-(3):

$R_{i,t} = \beta_{i,0} + \sum_{j=1}^{3} \beta_{i,j} R_{j,t-1} + \beta_{i,3} R_{INT,t-1} + \beta_{i,4} R_{XRt-1} + \varepsilon_{i,t}$;

$\sigma^2_{i,t} = \exp[\alpha_{i,0} + \sum_{j=1}^{3} \alpha_{i,j} f_j(z_{j,t-1}) + \gamma_i \ln(\sigma^2_{i,t-1}) + \alpha_{i,3} R_{INT,t} + \alpha_{i,4} R_{XRt}]$ and

$f_j(Z_{j,t-1}) = (|Z_{j,t-1}| - E(|Z_{j,t-1}|)) + \delta_j Z_{j,t-1}$ for i,j=1,2 and where $R_{i,t}$ is the daily percentage return for sector i at time t, $R_{j,t-1}$ is the daily percentage return for sector j at time t-1 and $z_{j,t-1}$ is the standardized innovation at time t-1. The parameters $\beta_{i,j}$ reflect the extent of price spillovers, $\beta_{i,3}$ and $\beta_{i,4}$ the price spillover from interest rates and exchange rates, $\alpha_{i,j}$ captures volatility spillovers, $\alpha_{i,3}$ and $\alpha_{i,4}$ the extent of volatility spillovers from interest rates and exchange rates, γ_i measures the persistence of volatility and δ_i captures the asymmetric impact of volatility. ***, **, and * denotes statistical significance at the 1%, 5% and 10% levels respectively. Numbers in parenthesis are robust standard errors.

Table 13
Model Diagnostics (p-values)

	BK	TEL	OIL
Brazil			
Sign bias test	0.8226	0.1137	0.0089
Negative size bias test	0.3889	0.3871	0.5171
Positive size bias test	0.4251	0.9569	0.0764
Joint test	0.5354	0.3613	0.0311
Hong Kong			
Sign bias test	0.7154	0.9191	0.9191
Negative size bias test	0.8571	0.8854	0.8854
Positive size bias test	1.0000	1.0000	1.0000
Joint test	0.9774	0.9988	0.9988

This table presents the results of the Engle and Ng (1993) tests for the asymmetric effect using the squared standardized residuals $(\varepsilon_{j,t}/\sigma_{j,t})^2$. These tests as specified as follows:

sign bias ($z^2_{j,t} \equiv (\varepsilon_{j,t}/\sigma_{j,t})^2 = \alpha + \beta S_{j,t} + \varepsilon_{j,t}$);

negative size bias ($z^2_{j,t} \equiv (\varepsilon_{j,t}/\sigma_{j,t})^2 = \alpha + \beta S_{j,t}\varepsilon_{j,t-1} + e_{j,t}$);

positive sign bias ($z^2_{j,t} \equiv (\varepsilon_{j,t}/\sigma_{j,t})^2 = \alpha + \beta(1-S_{j,t})\varepsilon_{j,t-1} + e_{j,t}$) and

joint test ($z^2_{j,t} \equiv (\varepsilon_{j,t}/\sigma_{j,t})^2 = \alpha + \beta_1 S_{j,t} + \beta_2 S_{j,t}\varepsilon_{j,t-1} + \beta_3(1-S_{j,t})\varepsilon_{j,t-1} + e_{j,t}$)

where $\varepsilon_{j,t}$ is the error from the conditional mean equation of the jth country at t, $S_{j,t}$ is the dummy variable that is equal to 1 if $\varepsilon_{j,t-1}$ and zero otherwise.

Table 14
Model Diagnostics (p-values)

	BK	TEL	OIL
U.K.			
Sign bias test	0.3862	0.4941	0.5315
Negative size bias test	0.0000	0.0000	0.3306
Positive size bias test	0.0000	0.0000	0.9330
Joint test	0.0000	0.0000	0.8050
Germany			
Sign bias test	0.0012	0.0000	0.4997
Negative size bias test	0.0000	0.0000	0.0017
Positive size bias test	0.0000	0.0000	0.8554
Joint test	0.0000	0.0000	0.0031
France			
Sign bias test	0.8820	0.1513	0.6370
Negative size bias test	0.0000	0.4812	0.5146
Positive size bias test	0.0091	0.0008	0.2854
Joint test	0.0000	0.0004	0.5885
Italy			
Sign bias test	0.0000	-	0.0912
Negative size bias test	0.0000	-	0.8568
Positive size bias test	0.0001	-	0.2593
Joint test	0.0000	-	0.2557

This table presents the results of the Engle and Ng (1993) tests for the asymmetric effect using the squared standardized residuals $(\varepsilon_{j,t}/\sigma_{j,t})^2$. These tests as specified as follows:

sign bias ($z^2_{j,t} \equiv (\varepsilon_{j,t}/\sigma_{j,t})^2 = \alpha + \beta S_{j,t} + \varepsilon_{j,t}$);

negative size bias ($z^2_{j,t} \equiv (\varepsilon_{j,t}/\sigma_{j,t})^2 = \alpha + \beta S_{j,t}\varepsilon_{j,t-1} + e_{j,t}$);

positive sign bias ($z^2_{j,t} \equiv (\varepsilon_{j,t}/\sigma_{j,t})^2 = \alpha + \beta(1-S_{j,t})\varepsilon_{j,t-1} + e_{j,t}$) and

joint test ($z^2_{j,t} \equiv (\varepsilon_{j,t}/\sigma_{j,t})^2 = \alpha + \beta_1 S_{j,t} + \beta_2 S_{j,t}\varepsilon_{j,t-1} + \beta_3(1-S_{j,t})\varepsilon_{j,t-1} + e_{j,t}$)

where $\varepsilon_{j,t}$ is the error from the conditional mean equation of the jth country at t, $S_{j,t}$ is the dummy variable that is equal to 1 if $\varepsilon_{j,t-1}$ and zero otherwise.

6. CONCLUSION

In this paper, we determine the impact of price and volatility spillovers from interest rates and exchange rates on the portfolio of ADR returns from the banking, telecom and oil & gas sectors from the countries of Brazil, U.K., Germany, France, Italy and Hong Kong. This paper also examines the asymmetric effects of positive and negative innovations of interest rates and exchange rates on volatility transmission of ADR returns in the three sectors.

Overall, the results indicate that price and volatility spillovers exist from interest rates and exchange rates to the three ADR portfolios from the banking, telecom, and oil & gas sectors. First, price spillovers exist from interest rates to the banking sector ADRs of Brazil, U.K., France, Italy, and Hong Kong, and from exchange rates to the banking sector ADRs of U.K., Germany, France, Italy, and Hong Kong. Second, there is evidence of price spillovers from interest rates to the telecom sector ADR portfolios of U.K., France, and Hong Kong, and from exchange rates to the telecom sector ADRs of Brazil, U.K., and Hong Kong. Third, there are price spillovers from interest rates and exchange rates to the oil & gas ADR portfolios of Brazil, U.K., Germany, France, Italy, and Hong Kong.

With regards to volatility, spillovers exist from interest rates to the banking portfolio of ADRs from Brazil, U.K., Germany, France, Italy, and Hong Kong, and from exchange rates to banking portfolio of U.K., Germany, France, and Hong Kong. Further, we find evidence of volatility spillovers from interest rates to the telecom ADR portfolios of Brazil, U.K., France,and Hong Kong, and from exchange rates to all the six country ADR portfolios. Lastly, volatility spillovers are also seen from interest rates to oil & gas ADR portfolios from Brazil, U.K., Germany, Italy, and Hong Kong, and from exchange rates to Brazil, Germany, France, Italy, and Hong Kong. Furthermore, with regards to response asymmetry, we find that for interest rates and exchange rates of Brazil, U.K., Germany, France, and Italy, negative innovations increase volatility more than positive innovations. These findings suggest that these markets are more sensitive to negative innovations originating from other markets than to positive innovations.

The findings enhance the understanding of ADRs' role in international diversification, their relationship with the U.S. and originating markets, as well as specific pricing factors. The findings further help portfolio managers to understand how markets are interrelated and thus assist in the development of effective hedging strategies against shocks that are transmitted across different sectors and markets. Additionally, they may also want to rebalance their portfolios from one market to another. The findings also suggest that interest rates and exchange rates are important determinants in ADR pricing. A proper understanding of how unexpected changes in interest rates and exchange rates are transmitted across different market sectors is required for monetary institutions to aid in determining their response to interest and exchange rate changes.

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ENDNOTES

1. See Grubel (1968); Lessard (1974, 1976), Koch & Koch (1991); Lau & McInish (1993).

2. Watson & Dickson (1981); Jorion & Schwartz (1986); Eun & Resnick (1998).

3. See http://www.bankofny.com/adr.

SPECIAL LENDING FACILITIES OF THE FED: ACTIONS AND RESULTS

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INTRODUCTION

Even though the most recent recession began in December 2007, bank reserves and the adjusted monetary base did not substantially increase until nine months later in September 2008. Data from the St. Louis Fed's Monetary Trends (August, 2009) show that reserves equaled $91.7 billion and the base equaled $847.7 billion when the recession began, and were approximately five percent and three percent higher respectively eight months later in August 2008. However, by September 2008, the data tell a different story about monetary policy. By April 2009, reserves had increased 934 percent, and the base had increased 111 percent over their levels when the recession began. What happened to Fed policy and what were the effects of these policies on financial markets and financial prices? This paper addresses these questions.

INITIAL FED MONETARY POLICY

This section of our paper examines monetary policy actions during the year before there was a marked increase in banks reserves and the monetary base. At their June 28 and August 7, 2007 meetings, the Federal Open Market Committee (FOMC) kept their target fed funds rate at 5.25 percent and their primary lending rate the usual 100 basis points over the fed funds rate. However, monetary policy assumed an unconventional stance beginning August 10, 2007, when the Fed announced that it was standing ready to make loans from the discount window. The new stance became especially clear on August 17, 2007 when they reduced the primary discount rate 50 basis points without decreasing the target federal funds rate, and opened the window to non-depository institutions like investment banks and securities dealers. They seemed to be encouraging borrowing from the Fed, as opposed to being a lender of last resort with a 100 basis point premium on loans from the Fed.[1]

The fed funds rate was not decreased until one month later on September 18, 2007, when it was decreased 50 basis points followed by a 25 basis points reduction on October 31, 2007, resulting in a feds funds rate of 4.5 percent and a primary discount rate of 5 percent. An additional 25 basis points reduction occurred December 11, 2007, the month the recession began, and the month when the first of many special lending facilities of the Fed was established. On December 12, 2007, the Term Auction Facility (TAF) was created to auction funds for as long as 28 days to borrowers, and currency swap lines were established with the ECB and SNB in the amounts of $20 billion and $4 billion, respectively. The first auction, in the amount of $20 billion, was held five days later, and on December 21, 2007, the Fed extended TAF "for as long as necessary to address elevated pressures in short term funding markets."

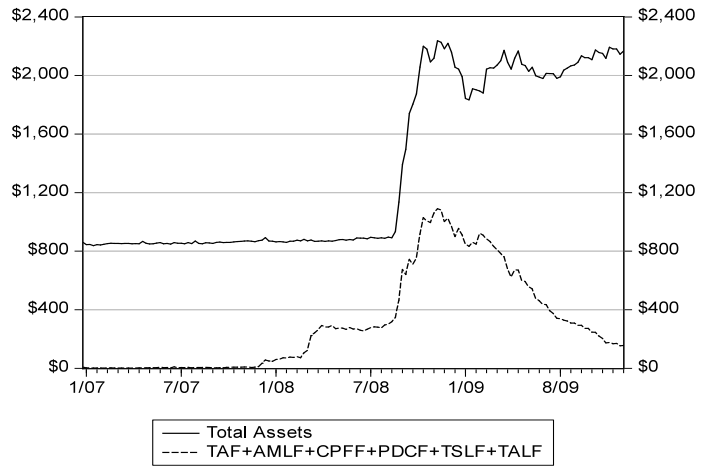
During January 2008, the Fed reduced interest rates twice by a total of 125 basis points, and in February expanded the size of the TAF auctions to $30 billion every two weeks. They were also very active in March with the introduction of the Term Securities Lending Facility (TSLF) which allowed primary securities dealers registered with the Fed to swap securities for more liquid Treasuries (Appendix B), and expanded currency swap lines with the ECB and SNB. A few days later the New York Fed financed the J.P. Morgan purchase of Bear Stearns for $29 billion, and reduced the primary discount rate to 25 basis points over the target fed funds rate. Two days later, both were reduced 75 basis points. By April 30, 2008, the target rate was 2 percent. The reader should note how rapidly the Fed reduced rates during this eight month period and how small the impact was on monetary policy where monetary policy, is defined as actions that change the monetary base. Thornton (2009b) notes that "until mid-September 2008, the Fed offset the effect of credit through open market operations." In addition, "hundreds of billions of dollars of 'liquidity' supplied through these facilities had no impact on the monetary base and, consequently, no effect on the total supply of credit in the financial market." This can be seen in Figure 1.

The Fed was relatively quiet during the May through August 2008 period with no interest rate changes, and no new special lending facilities. They did approve Bank of America's purchase of Countrywide in June 2008, gave discount window access to Fannie Mae and Freddie Mac in July, expanded TAF auctions to 84 days, and increased ECB swap lines.

As the spread between the London inter-bank offered rate (LIBOR) and the fed funds rate widened in August 2008 to 75 basis points, the Federal Reserve used TAF to expand credit in these markets and narrow the spread to the historical norm of approximately 10 basis points. While the program was closely related to the primary lending facility of the Fed's discount window, the TAF program was designed to reduce the stigma related to borrowing directly from the Fed. The process was based on auctions that determined both the interest rates and amounts that financial institutions received. Armantier, Krieger, and McAndrews (2008) explained the program as follows: "The facility is designed to be useful when short-term money markets are not operating efficiently, and when borrower appetite for even a term discount window program is limited because of some combination of stigma and price. In these

situations, by satisfying at least some of the demand for term funds that is not being met by the markets, the TAF may offer banks greater assurance of their ability to borrow term funds, thereby reducing constraints on the institutions' allocation of credit." Figure 2 indicates that the spread reached the maximum weekly average of 4.85 percent during the week of October 13, 2008 in spite of $263 billion allocated to TAF that week.

Figure 1
Special Lending Facilities and the Fed's Assets

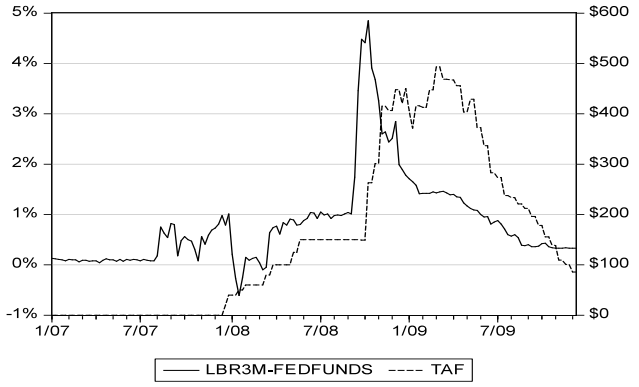


Note: The total assets of the Federal Reserve and the accumulated total of the following six primary tools: Term Auction Facility (TAF), Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF), Primary Dealer Credit Facility (PDCF), Term Asset-Backed Securities Loan Facility (TALF), and Term Securities Lending Facilities (TSLF). All data are weekly averages in billions of dollars from January 1, 2007 through December 15, 2009.

Source: http://www.clevelandfed.org/research/data/credit_easing/index.cfm

Date	TOTAL ASSETS	TAF+CPFF+TALF+AMLF+PDCF+TSLF	Events
1/1/2007	860	7	TSLF Existed
12/17/2007	871	11	Start of TAF 12/12/2007
3/17/2008	880	106	Start of PDCF 3/16/2008
9/22/2008	1,135	465	Start of AMLF 9/19/2008
10/13/2008	1,741	744	Start of CPFF 10/7/2008
12/8/2008	2,238	1,090	Maximum Level
3/23/2009	2,053	866	Start of TALF 3/18/2009
12/15/2009	2,167	155	Last Date of Sample

Figure 2
Libor/Fed Funds Rate Spreads and TAF Lending



Note: The spread between the London interbank offered rate (LIBOR) and the Fed funds rate (FED_FUNDS) are measured on the left axis. Data on the right axis are in billions of dollars for the Term Auction Facility (TAF) used by the Federal Reserve. All data are weekly averages from January 1, 2007 through December 15, 2009.

Sources: http://research.stlouisfed.org/fred2/categories/22
http://www.clevelandfed.org/research/data/credit_easing/index.cfm

Date	LBR3M-FEDFUNDS	TAF	Events
1/1/2007	0.13	0	First Date of Sample: "Normal" Spread
8/13/2007	0.75	0	Spread Widens
12/24/2007	0.79	20	TAF Started 12/12/2007
10/13/2008	4.85	263	Maximum Spread
7/27/2009	0.60	238	TAF Auction Offer Reduced to $100bn
12/15/2009	0.33	86	Last Date of Sample
Mean	0.84		

Others have questioned the impact of TAF on the Libor-Fed funds rate spreads by assuming that the cause was either lack of liquidity or counterparty risk. Duca (2009) shows that "in fall 2008, Libor spreads spiked largely because it was unclear how much counterparty risk other companies faced as a result of Lehman Brothers' collapse and similar events that might follow." Taylor (2009) also concludes that the crisis was not an issue of liquidity, but an issue of counterparty risk when he wrote: "If the reason for the spread is seen as counterparty risk as distinct from liquidity, it is not surprising that the TAF did not make much difference." The Term Auction Facility's effectiveness, according to a paper by Wu (2008), was that "the empirical results suggest that the Term Auction Facility (TAF) has strong effects in relieving the liquidity concerns in the inter-bank money market, yet has little effect in lowering the counterparty risk premiums among major financial institutions."

AGGRESSIVE MONETARY POLICY

As one can see in Figures 1 and 2, there was a dramatic change in monetary policy in September 2008, even though the FOMC maintained the status quo regarding interest rates at their September 16th meeting. The monetary base increased more than 100 percent in September and October, as there was increasing evidence of bottlenecks and inefficiencies in global credit markets.

The following actions by the Fed over five weeks, beginning with the $85 billion loan to AIG on September 16, reveal the degree of Fed commitment to making credit markets more efficient. In chronological order they established the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity (AMLF), as another special lending facility, which allowed banks to borrow money at the discount rate for two week terms with high grade corporate paper as collateral. Goldman Sachs and Morgan Stanley were granted bank holding company status and new currency swap lines were established with the central banks of Denmark, Norway, and Australia. The total amount of the swaps was increased to $290 billion, and only three days later was increased again to $620 billion. This same day, September 29, the Fed provided the funds for Citibank to buy Wachovia, and increased funding for 84-day TAF loans.

During October, 2008, the commitment to TAF loans was expanded to $900 billion, and the Commercial Paper Funding Facility (CPFF) was established. The Fed financed a special purpose vehicle that purchased three-month commercial paper from eligible participating institutions and held the paper to maturity. They also decreased the federal funds rate and the discount rate to 1.5 and 1.75 percent respectively, and began to pay interest on reserves held at the Fed in an effort to set a floor under market interest rates. October 2008 concluded with the establishment of the Money Market Investor Funding Facility (MMIFF) and the reduction of rates to 1 and 1.25 percent.

How effective were the AMLF and CPFF facilities? Figure 3 indicates that 2008 began with the spread between 91-day commercial paper and T-bills at a normal thirty-one basis points. This spread had increased to more than 200 basis points when

the AMLF began on September 19, and increased to 325 basis points by October 7. The initial AMLF funding did not seem to be successful, so the Fed began the CPFF. The combination of these two special lending facilities was effective in bringing this spread back into a nearly normal range after only a short period of time. After three and one-half months, the spread was only 72 basis points, and the total funding for the two programs had been highly effective in providing a persistently more normal spread as it reached a weekly average of 14 basis points for the week of September 14, 2009.

During November 2008, the Term Asset-Backed Loan Facility (TALF) was established. The Fed provided loans backed by high quality, newly issued, securities that were issued to buy packages of loans made to finance consumer purchases. Examples were student, auto, credit cards, and small business loans. 2008 ended with the final reduction in target rates to a range of zero to twenty-five basis points on December 16, 2008.

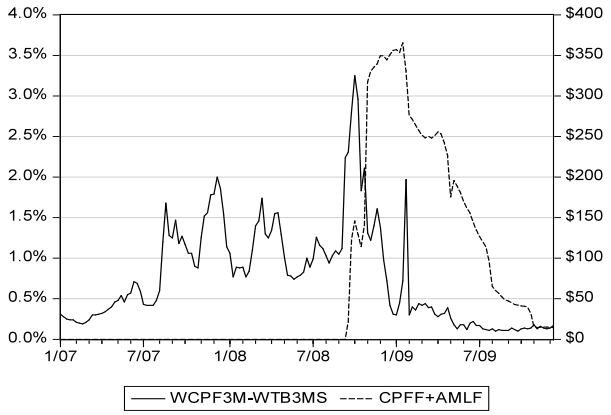
Why this flurry of monetary policy actions in the last four months of 2008, especially September and October, and what were the effects on financial markets and prices? Figures 2 and 3 are helpful in addressing these issues. The former includes the much discussed Libor/fed funds rate spread and the first aggressive special lending facility, TAF. The spread was constant and close to zero until August 2007, and became volatile around a mean of approximately zero until September, 2008. After that, it increased to almost 5 percent before falling sharply as the Fed injected liquidity with the TAF, CPFF, and AMLF facilities.

> What about TALF? Consider the following quotation (Robinson, 2009)
>
> When the housing bubble burst, the value of the collateral backing much of the ABS declined sharply, and so did the value of the securities themselves. Not surprisingly, investors shunned ABS, and this important source of credit grew scarce. The Federal Reserve responded by creating the term asset-backed securities loan facility, or TALF. Its purpose is to boost securitization by providing loans to people holding certain highly rated ABS. These loans will then support new ABS issues and help thaw the securitization markets.

TALF was announced in November 2008, and the Fed planned as much as $1 trillion in loans to buyers of top-rated securities collateralized by the assets listed above. The funding by the Fed through this program started in March 2009 with $670 million the first week. (See Figure 4) The requested total for the first round was $4.7 billion, but only $1.7 billion in the second round as the political implications for the institutions which receive these funds became clear. Not only were many of these firms worried about compensation mandates within their firm by the government if they took TALF funds, but the firms also feared that their profitability will be reduced if the government stipulated criteria for profits.

Another limitation of the program was that the maximum length of the loans was only three years. Controversy occurred at the Fed. Should the TALF program be expanded to include both three-year and five-year loans to promote investors to buy long term commercial backed securities (CMBS)? Although the intention was to provide stability in the CMBS market which had a record amount of debt coming due before 2012, Hilsenrath and Wei (2009a) stated that "Fed officials wanted to accommodate investors, but feared that if they went too far they could undermine the central bank's longer-run objectives." They also noted (2009b) that "the Fed announced new loans with five-year terms to better match the needs of investors in

Figure 3
The CPFF, AMLF, and 3-Month Commercial Paper and 3-Month T-bill Spreads

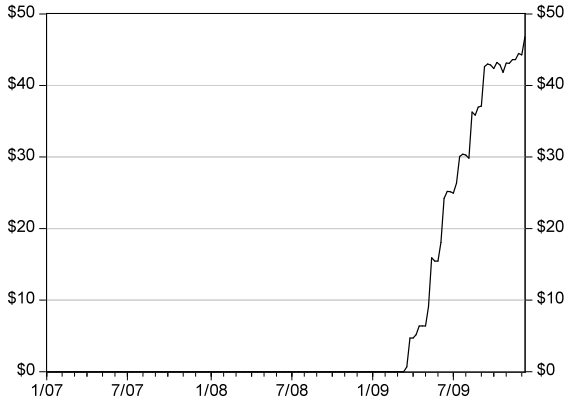


Note: The spreads between the 3-month AA financial commercial paper rates and 3-month Treasury bill rates are measured on the left axis. Data on the right axis are in billions of dollars for the Commercial Paper Funding Facility (CPFF) and the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) used by the Federal Reserve. All data are the weekly averages from January 1, 2007 through December 15, 2009.

Sources: http://research.stlouisfed.org/fred2/categories/22
http://www.clevelandfed.org/research/data/credit_easing/index.cfm

Date	WCPF3M-WTB3MS	CPFF+AMLF	Events
1-Jan	0.31	0	First Date of Sample
9/15/2008	2.24	0	MM Come Under pressure 09/17/2008
9/22/2008	2.31	22	AMLF Begins 9/19/2008
10/6/2008	3.25	146	CPFF Begins 10/07/2008
1/19/2009	0.72	365	Maximum Level for Facilities
12/15/2009	0.17	14	Last Date of Sample
Mean	0.77		

Figure 4
Term Asset-Backed Securities Loan Facility (TALF)



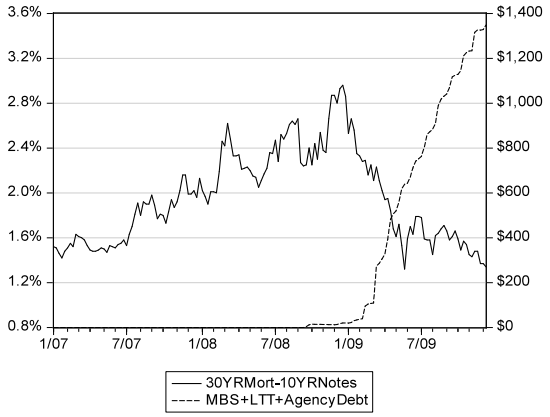
Note: Data are in billions of dollars measured by weekly averages from January 1, 2007 through December 15, 2009.

Sources: http://www.clevelandfed.org/research/data/credit_easing/index.cfm

Date	TALF	Events
3/23/2009	.67	TALF Begins
5/4/2009	6	Eligible Collateral Expanded
5/25/2009	15	Announced Acceptance of Legacy CMBS
8/17/2009	36	Extended but Eligible Collateral List Not Changed
12/15/2009	47	Last Date of Sample

commercial-mortgage-backed securities and boost that sector." $100 billion of the amount allocated to the TALF program was made available for 5-year terms to expand the amount of credit that the Fed could provide in the downturn. Bianco and Ergungor (2009) showed the positive impact that the TALF program had on asset-backed security rates. Before the announcement of the program, the auto ABS and credit card ABS were both rising at a rapid rate. Immediately after TALF began, both asset-backed securities (ABS) decreased to the 4 to 5 percent yields that existed before September 2008.

Figure 5
Interest Rate Spreads and Fed Bond Purchases

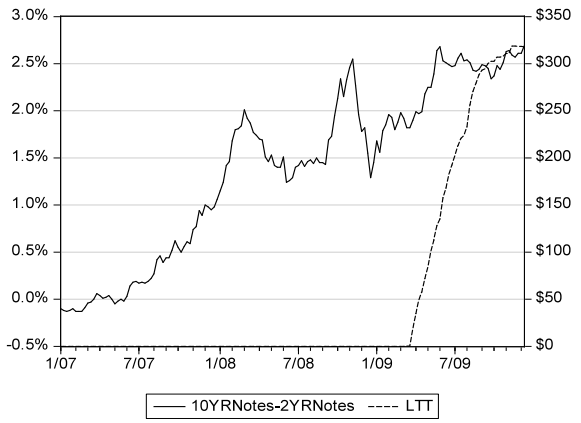


Note: The spread between 30-year mortgage rates (30YRMort) and 10-year Treasury bond yields (10YRNotes) are measured on the left axis. Data on the right axis are the total of Federal Reserve purchases of mortgage backed securities (MBS), long term Treasurys (LTT), and agency debt in billions. All data are weekly averages from January 1, 2007 through December 15, 2009.

Sources: http://research.stlouisfed.org/fred2/categories/22
http://www.clevelandfed.org/research/data/credit_easing/index.cfm

Date	WRMORTG-WGS10YR	MBS+LTT+ADEBT	Events
1/1/2007	1.52	0	First Date of Sample
9/3/2007	1.98	0	Spread Widens
9/22/2008	2.25	4	Agency Debt Purchases Begin
1/12/2009	2.66	22	MBS Purchases Begin
3/16/2009	2.23	272	LTT Purchases Begin
12/15/2009	1.34	1,348	Last Date of Sample
Mean	1.96		

Figure 6
LTT and Spreads Between 10-Year and 2-Year Yields



Note: The spread between the 10-year Treasury constant maturity rates and the 2-year Treasury constant maturity rates is measured in percentages on the left axis. Data on the right axis are in billions of dollars for the Long Term Treasury (LTT) purchases used by the Federal Reserve. All data are weekly averages from January 1, 2007 through December 15, 2009.

Sources: http://research.stlouisfed.org/fred2/categories/22

Date	WGS10YR-WGS2YR	LTT	Events
1/1/2007	-0.10	0	First Date of Sample
3/16/2009	1.82	.28	LTT Purchases Begin
4/6/2009	1.99	35	Three Weeks After Purchases Begin
12/15/2009	2.69	317	Last Date of Sample
Mean	1.4		

However, there were remaining problems. "TALF has been bogged down with delays for months, as investors and issuers negotiated with the Fed and the Treasury to adjust the terms of the loans. TALF was initially launched November 2008, and the government trickled out few details about it until this February 2009, when the program became a marquee feature of Treasury Secretary Geithner's revamped plans to stabilize the financial system." (Rappaport, 2009) While the TALF program had a number of different markets that the Fed expected to impact, two significant parts of the program were to create a market for existing CMBS and to unfreeze the market for new CMBS issues. The markets initially cheered the news of TALF due to the expected boost that it would give to the financing drought in the commercial real estate market, but the Fed rules required that only the highest rated CMBS were available for funding. This diminished the potential impact that the TALF program had on this particular market and "among those that won't qualify: floating-rate mortgages, construction loans or loans secured by properties that don't have a steady cash flow, according the Fed." (Wei, 2009a)

MONETARY POLICY IN 2009

After its January 27-28, 2009 meeting, the FOMC stated its intentions to buy long term Treasuries and keep interest rates unchanged at their December, 2008 lows for "an extended period of time." They continued this through 2009 and 2010. During February 2009 they extended all special lending facilities that were set to expire in April to the end of October 2009, and expanded the TALF program to a maximum of $1 trillion, and altered the collateral that was acceptable for TALF loans. Finally, on March 18, 2009, the Fed stated that it would buy $300 billion in long term Treasury debt, and also increase its purchases of agency debt.

The monetary base was volatile, but its trend was unchanged in 2009. (See Figure 1) However, the Fed was very busy as it had phased out the six special lending facilities that are addressed in this paper, and sharply increased its holdings of mortgage backed securities, long term Treasuries, and agency debt. Figure 1 shows that the assets acquired by the six special lending facilities decreased from $866 billion to $155 billion between March and December 2009, and Figure 5 shows that the total long term debt purchased by the Fed between September 2008, when agency debt purchases began, and September 2009 was $1.35 trillion. Almost all of this was purchased after January 12, 2009 when the Fed initiated its purchases of mortgage backed securities (MBS).

What were the effects of monetary policy on financial prices in 2009? First, what would one expect? We expected the yield curve to "flatten" as short term yields remained between zero and one percent, and bond prices increased as the Fed's actions increased the demand for both long term Treasury bonds and MBS. Using the spread between 10-year and 2-year maturities as a proxy for the yield curve, our expectations were not realized. As Figure 6 indicates, this yield curve became steeper. Perhaps worries about the Fed's "exit strategy" when it must reduce its assets to shrink the monetary base to prevent inflation and expectations of higher future short term rates and inflation

prevented this program from working. In a discussion on these issues, Thornton (2009a) concludes that given the large number of events in financial markets, "it is difficult if not impossible to attribute the steepening of the yield curve to a particular factor." We do know that long term interest rates decreased when the Fed announced its intentions to buy longer-term Treasuries, but that immediate effect was not permanent.

In Figure 5, we see some evidence of success. The Fed was able to decrease 30-year mortgage rates relative to other long term rates as they became the largest holder of MBS in 2009. During 2009, this spread decreased approximately 150 basis points.

FUTURE MONETARY POLICY

An alternative title for this section could be the much discussed question, "what is the Fed's 'exit strategy'" from $2.17 trillion in assets it held December 15, 2009, and continued to hold in 2011. In fact, by early 2011, its assets had increased to $2.42 trillion. The question is not if it will decrease its assets, but when and how? The answer to the question would be much easier if the Fed were only holding short term assets in special lending facilities. All they would have to do is let the programs expire, liquidate the assets as they mature, and allow newly issued assets to be purchased in private financial markets as they did in the commercial paper market. However, they became less and less liquid as their policies evolved from special lending facilities to QE1 and QE2 which are scheduled to end June, 2011.

In a guest article on the Opinion page of the Wall Street Journal (July 21, 2009), Fed Chairman Bernanke offered several alternative exit strategies to use when the extremely large reserves banks hold at the Fed cause M2 and MZM to grow at rates that would cause inflation. When the time comes to tighten monetary policy the Fed could pay higher interest rates on deposits at the Fed and reduce the stock of reserves as well. If the higher interest rates on reserve balances do not prevent an excessive growth of money and credit, the Fed can directly reduce reserves with four options available to them according to Bernanke. First, they could arrange large-scale reverse repurchase agreements with various financial institutions, including banks. Second, the Treasury could sell bills, and increase Treasury deposits at the Fed which would decrease the monetary base. Third, the Fed could offer interest on term deposits made by banks at the Fed, and banks would not be able to use these reserves to make loans in the Fed Funds market. Finally, the Fed could sell long term securities in the open market.

It seems to us that the latter is the Fed's best option to prevent inflation. By directly selling mortgage backed securities, agency bonds, and Treasury bonds, they should be able to slow the growth of real output, especially durable goods and housing sectors, as they reduce the base. The questions are, do they have credibility and can they conduct independent monetary policy once it becomes necessary if they are to prevent inflation? (Gongloff, 2009)

CONCLUSIONS

In this paper we examined monetary policy from August 2007, when the Fed engaged in its first unconventional action, through December 2009, when most of the Fed's special lending facilities became inactive. However, the monetary base remained in excess of $2 trillion which was more than double its size when these lending facilities began. Two things are very clear. The quantity of the Fed's assets has increased, and the quality has decreased. In the latter case, the Fed's portfolio is less liquid with fewer T-bills, and more T-bonds, agency bonds, and mortgage backed bonds. They have assumed more risk by swapping their low risk assets for higher risk assets. It is not clear that there is less risk in the financial system. It may be that there is only a change in the economic agents that have assumed that risk.

Regarding specific Fed choices oriented toward specific financial markets, did they work? The Fed was able to thaw the commercial paper market, and reduce rates on paper to normal spreads over T-bill yields, and have been able to reduce mortgage interest rates relative to T-bond yields, but unable to reduce long term rates in general. The PDCF facility, which acted as a supplement to discount window lending, worked well in the sense that the Fed was able to make the loans when they were needed and exit from the program quickly. The same can be said for the TSLF facility, but the TALF program did not work well. Indeed, extending the terms of loans to five years in the very depressed commercial real estate market, in an effort to make the program more effective, may have been a substantial mistake.

However, overall it is difficult to criticize many of the Fed's individual actions. They were faced with a perceived global credit "crisis", and normal actions associated with lower target interest rates and open market operations had not worked by September-October 2008, when the "crisis" became most evident. Perhaps the reason monetary policy had not been effective was that they had not used monetary policy, even though it appeared that they had done so. One can write this because bank reserves and the monetary base did not increase before September, 2008.

Where does this leave us regarding future Fed actions? That is, when and how will the Fed reduce reserves and the base to prevent an inflation problem? Chairman Bernanke has offered us four choices, but it appears to us that the only viable choice is that the Fed must sell less liquid assets from its portfolio, and simultaneously improve the quality and reduce the quantity of its assets. This action, other things equal, will almost surely increase real interest rates, especially long term rates. However, other things may not be equal, because these actions by the Fed should reduce inflationary expectations.

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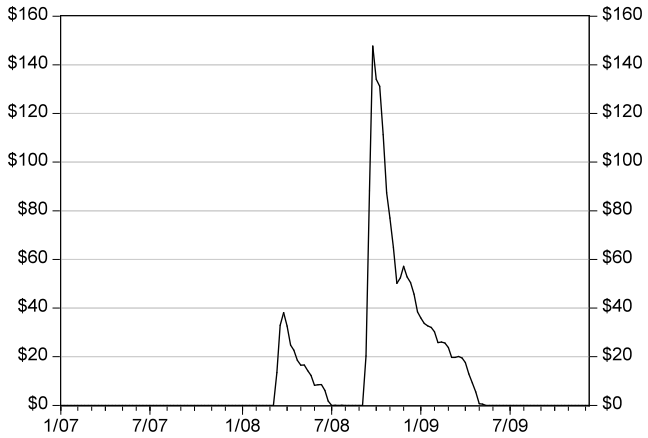
ENDNOTES

1. All monetary actions in this paper were downloaded from the Fed's web-site, http://www.ny.frb.org/research/global_economy/Crisis_Timeline.pdf.

Appendix A
Figure 7
Primary Dealer Credit Facility (PDCF)



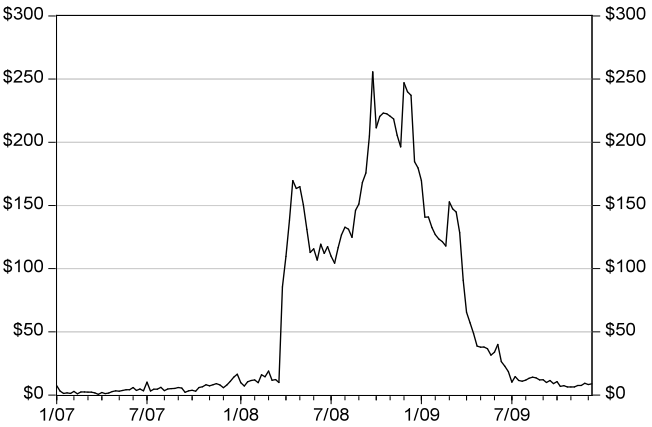
Note: Data are in billions of dollars measured by weekly averages from January 1, 2007 through September 14, 2009.

Sources: http://www.clevelandfed.org/research/data/credit_easing/index.cfm

Date	PDCF	Events
9/15/2008	20	PDCF Begins
3/31/2008	38	Maximum Level First Round
7/7/2008	0	
9/29/2008	148	Maximum Level Second Round
5/18/2009	0	PDCF Ends

PDCF began in March 2008 and ended in May 2009, as can be seen in Figure 7. The facility provided overnight loans to investment banks in an effort to stimulate short-term borrowing between these banks. The facility was active during two periods, March and April, 2008, (Bear Stearns failure), and September to October, 2008 (Lehman Brothers). (Tobias, et al., 2009)

Appendix B
Figure 8
Term Securities Lending Facility (TSLF)



Note: Data are in billions of dollars measured by weekly averages from January 1, 2007 through December 15, 2009.

Sources: http://www.clevelandfed.org/research/data/credit_easing/index.cfm

Date	TSLF	Events
1/1/2007	7	First Date of Sample
3/10/2008	12	Program Initiated Further 3/11/2008
5/5/2008	165	Eligible Collateral Expands to AAA Rated ABS
9/29/2008	256	Maximum Level
12/15/2009	9	Last Date of Sample

TSLF began in March 2008, and had effectively ended by September, 2009. It allowed securities to be swapped for Treasuries that were owned by the Fed. Primary dealers registered with the Fed were eligible to participate. As one can see in this Figure, it did $160 billion of business in its first four months, then declined, and became very active in the final four months of 2008.

CUSTOMER SATISFACTION – OH WHAT A FEELING

James Walker, Northwest Missouri State University

INTRODUCTION

When the marketing concept's directive — understand customer wants and needs to satisfy them — came to prominence a half century ago both practitioners and academicians took notice. Customer satisfaction has arguably been one of the most studied and written about business subjects since. Practitioners espouse its' importance daily, Amazon.com lists over 22,000 books on the subject, conferences are held to discuss it, and academic journals are devoted to its' study. Although practitioners and academicians may disagree on many things, the importance of satisfying customers is not one of them.

Since the marketing concept's genesis all those years ago, significant progress has been made toward better understanding customer satisfaction. This article will explore such progress including insights about the emerging role emotions play in such judgments. Initially foundations of customer satisfaction will be offered and the traditional expectancy-disconfirmation model detailed. Next emotional additions will be described and an exploratory empirical study forwarded. Finally, implications resulting from understanding emotions as one part of the customer satisfaction equation will be offered.

CUSTOMER SATISFACTION: FOUNDATIONS

Theodore Levitt focused academic and practitioner thinking on satisfying customers when he wrote about corporate purpose. In *The Marketing Imagination* he wrote:

> "I see a constant that defines the best. It says that there can be no effective corporate strategy that is not marketing oriented, that does not in the end follow this unyielding prescript: The purpose of a business is to create and keep a customer. To do that, you have to do those things that will make people *want* to do business with you. All other truths on this subject are merely derivative." (Levitt 1986, 19).

Successful businesses understand to create and keep customers they must satisfy them. Based upon work with over a thousand small businesses, Taylor and Archer (1994) conclude that "All businesses, regardless of type, have one common bond: They exist solely to serve and satisfy their customers. Neglecting or losing sight of this one fact has caused the early failure of millions of small businesses" (22). The ability to satisfy customers is at the core of every successful organization. One can "create" customers by having the lowest price, being the first to serve a particular market, by making claims of superiority, or by a multitude of other means but it is the "keep" portion — the satisfaction portion — that matters for continued success.

In a competitive marketplace only those firms that satisfy customers are able to keep them. And keeping customers has its benefits. Reicheld and Sasser's (1990) research across multiple industries illustrates keeping five percent more customers can improve a firm's bottom line by 25 to 85 percent; it's simply less expensive to retain current customers than constantly prospect for new ones. Oliver (1997) reports on a study commissioned for *Fortune* magazine across multiple industries where a five percent increase in loyalty (retention) resulted in an average profit gain of 73 percent (calculated in terms of lifetime profit per customer). Schnaars (1998) notes that firms which satisfy customers have built-in protection against low-cost producers because satisfied customers are often less price sensitive and more likely to spread positive word of mouth. In today's landscape, where word of mouth (or word of "mouse") travels faster than any time in our past, satisfying customers is important.

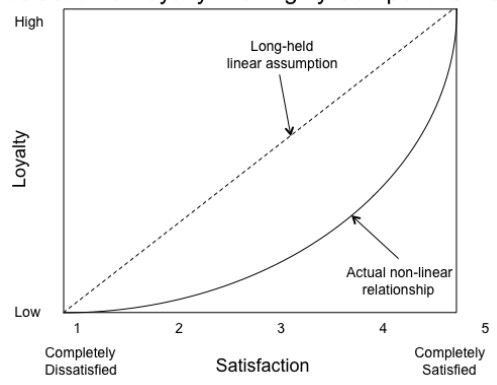
Satisfying customers is important but it may not be enough. Jones and Sasser (1995) found in highly competitive markets only those customers most satisfied, those *completely* satisfied, remain loyal. Empirical evidence also illustrates the financial benefits associated with *completely* satisfying customers. Carr (1999) reports on a study of 1,500 bank customers comparing account balances with shifts in satisfaction ratings over a 15 month period. The average account balance of highly satisfied customers increased by $4,800 and those moving from satisfied to highly satisfied increased by $4,500. Perhaps more telling is the average account balances of highly satisfied customers whose satisfaction levels fell dropped by $1,000 and those satisfied customers whose satisfaction levels fell dropped by $1,400. These findings indicate that it doesn't take long for customer satisfaction levels to influence subsequent actions (Carr 1999).

Jones and Sasser's (1995) research undermined a long-held assumption that customer satisfaction and loyalty are directly related. It was once widely believed (and probably still is by many) that a linear relationship exists between customer satisfaction and loyalty; as one goes up the other goes up in a directly proportional manner. However the actual relationship, in a competitive marketplace, is non-linear in that only those most satisfied customers remain loyal (see Figure 1). Uncovering evidence to undermine such a long-held belief suggests the need to better understand exactly what customer satisfaction is and how a firm can go about *completely* satisfying customers. The next section will explore the most common conceptual understanding of customer satisfaction; the expectancy-disconfirmation model.

THE EXPECTANCY-DISCONFIRMATION MODEL IN CUSTOMER SATISFACTION

One early definition of customer satisfaction is "an evaluation rendered that the (consumption) experience was at least as good as it was supposed to be" (Hunt 1977, 459). Tse and Wilton (1988) subsequently defined it as a "consumer's response to the evaluation of the perceived discrepancy between prior expectations [or some other norm of performance] and the actual performance of the product as perceived after its consumption" (204). More recently Oliver (1997) defined satisfaction as a "consumer's fulfillment response. It is a judgment that a product or service feature, or the product or service itself, provided (or is providing) a *pleasurable* level of consumption-related fulfillment, including levels of under-or-overfulfillment" (13). The two earliest definitions have a cognitive (rational) focus whereas the latter offers an emotional element as well. While customer satisfaction's formal definition evolves, most conceptualizations use some portion, or all, of the expectancy-disconfirmation framework. The customer satisfaction judgment process described by the expectancy-disconfirmation model is shown in Figure 2.

Figure 1: Relationship Between Customer Satisfaction & Loyalty in a Highly Competitive Market



Adapted from Jones, T. O., and W. E. Sasser. 1995. Why satisfied customers defect.. *Harvard Business Review* (Nov-Dec): 88-99.

Figure 2: The Expectancy-Disconfirmation Model

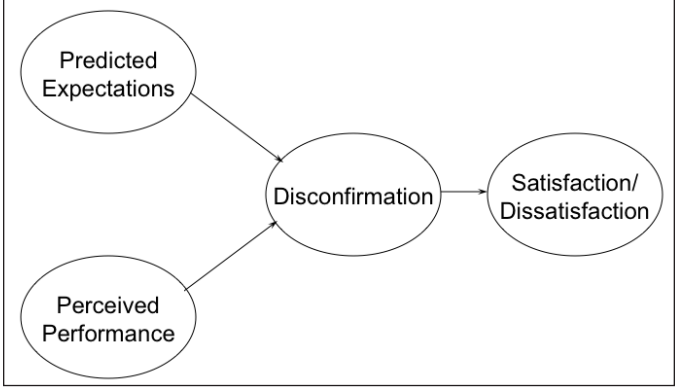
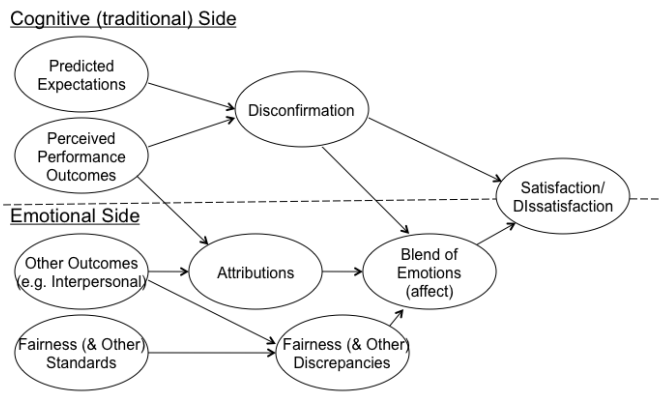


Figure 3: The Expectancy-Disconfirmation Model: With An Emotional Component



Adapted from Oliver, R. L. 2000. Customer satisfaction with service. in *Handbook of Services Marketing & Management* (eds. T. A. Swartz and D. Iacobucci), Thousand Oaks: Sage Publications: 247-254.

According to this model consumers bring expectations to a consumption encounter. These expectations, conceptualized as predicted expectations, are what a consumer anticipates, or predicts, will occur. Predicted expectations differ from other expectation types (for a discussion of alternative expectation types in customer satisfaction research see Prakash and Lounsbury 1984; Oliver and Winer 1987; Oliver 1997). For example, if one asks a group of customers how long they expect to wait before being seated at a nice restaurant, one customer might indicate within five minutes stemming from desired expectations; the time they hope for or desire to be seated. Another might indicate within 30 minutes stemming from minimum expectations; the time they consider acceptable/adequate to be seated. However if you ask these same customers how long they predict they will be waiting, you are likely get a different response (most probably somewhere between the two expectation types outlined above).

Customers also have performance perceptions. Customers use what they know to be true, driven from their perceptions of the world, rather than some internal/objective organizational performance standard or measure. To illustrate the difference, consider the following. Universities survey hundreds of customers (students) annually about perceptions of performance. Several years ago an inexperienced colleague was required to teach an upper level marketing research course. At year end, students rated the professor's performance quite highly yet the objective reality was indeed different. Besides not having the necessary breadth of content knowledge the professor actually taught incorrect statistical procedures/calculations which were a vital component of the course. So a reasonable person could conclude that the professor's objective performance was less than optimal, however it was student perceptions that drove evaluations rather than any measure of objective performance — it is performance perceptions that matter.

These two constructs (predicted expectations and performance perceptions) are cognitively compared in the disconfirmation stage which empirical evidence indicates has a significant effect on customer satisfaction (Westbrook 1987; Tse and Wilton 1988; Oliver and Desarbo 1988; Yi 1993). The reported relationships between disconfirmation and satisfaction are significant and robust across product, situation, and methodology (Oliver 1989). Disconfirmation results in one of three possible cognitive outcomes. Negative disconfirmation occurs when consumers expected more than the performance they perceived (E>P) which results in dissatisfaction and the greater the discrepancy the greater the dissatisfaction.

Confirmation occurs when perceived performance equals customer expectations (E=P) which results in satisfaction or as some label it neutrality. Regardless, confirmation does not lead to high levels of customer satisfaction. Positive disconfirmation, the final possible outcome, occurs when customers perceive performance as greater than their expectations (E<P) which results in satisfaction and the greater the discrepancy the greater the satisfaction.

The expectancy-disconfirmation model illustrates one key to creating *completely* satisfied customers is exceeding predicted expectations. However, customer satisfaction judgments contain more than a cognitive comparison of expectations and performance perceptions — there is an emotional component. In a review of the customer satisfaction literature, Fournier and Mick (1999) state that researchers have probably underestimated emotional aspects of customer satisfaction calling for more research. One vein of such research will be discussed next.

CUSTOMER SATISFACTION'S EMOTIONAL COMPONENT

As America grew from a manufacturing to a services based economy, involving significantly greater interpersonal interaction, customer satisfaction research turned its focus there. And it was in part through a marrying of customer satisfaction and services research that a new expectancy-disconfirmation model emerged.

Oliver (2000) forwarded an extension to the traditional model adding a vital, but overlooked, component; emotions. According to this work the expectancy-disconfirmation model outlined in Figure 2 also includes emotional markers related to disconfirmation, attributions, and fairness discrepancies which flow into an overall affective (blend of emotions) component. This model indicates that customer satisfaction is a hybrid response carrying both knowledge (cognitive) data and emotional content (Oliver 2000). Oliver's model, shown in Figure 3, includes in the top half the traditional (cognitive) component and in the bottom half the new (emotional) component.

The first major addition to the disconfirmation model, attributions, is a consumer's assessment of causal responsibility for outcomes deemed relevant in life (Oliver 2000). Attributions are in essence a consumer's mental search for causes of behavior (e.g. "what can I attribute that behavior to?") and are triggered by observations of outcomes in the consumption experience ("Performance Outcomes" and "Other Outcomes" in Figure 3). Consumers make numerous attributions daily (e.g. Why did the employee look at me like that?). Attributions, and their resulting mental responses (correct or incorrect), help consumers make sense of the world. Framed from a customer satisfaction point of view that means customers mentally search for "what caused that" in terms of the firm/employee providing the product/service performance (e.g. The employee looked at me that way because she's working on commission).

The second major addition is fairness discrepancies which describe the outcome of consumers comparing how they were treated by a firm to their own internal standards as to how they should be treated ("Fairness Standards" and "Other Outcomes" in Figure 3) (Oliver 2000). Internal fairness standards can include consumer beliefs about how much effort should be put into consuming a product/service versus how much effort the firm should provide and the level of respect, politeness, and dignity necessary from the service provider (Oliver 2000). Judgments about whether a price paid seemed fair or if a service provider gave preferential treatment to certain customers are examples of fairness discrepancy judgments.

The two major conceptual additions of attributions and fairness discrepancy judgments, along with disconfirmation judgments, are not singularly important by themselves but rather it is the emotional markers attached to each that matter. Oliver (2000) recognizes three major sources of satisfaction emotion. One is an overall impression of the purchase outcome as being favorable or unfavorable resulting in emotional markers such as happiness or sadness respectively. A second set of emotional markers stem from disconfirmation and fairness discrepancy judgments. For example situations in which disconfirmation is better than expected can result in glee or delight whereas consumers believing the provider was much less fair than expected can result in resentment or anger. The third set of emotional markers result from attributions in which consumers can attribute blame or gratitude for bad and good outcomes respectively (emotional markers beyond those selected for illustrative purposes exist; see Oliver 1997). As shown by Figure 3, the emotional markers stemming from disconfirmation, attributions, and fairness discrepancies feed into an overall blend of emotions. A net blend of positive markers contributes to satisfaction while a net negative blend contributes to dissatisfaction (Oliver 2000).

Although the model shown in Figure 3 is appropriate for both goods and services, emotions are believed to play a larger role in the services sector. "It would be expected that the human delivery aspect of service would bring forth greater attention to — and processing of — those model components most subject to interpersonal influences. The net result of the human element of service delivery is a greater interplay of emotion in the service satisfaction response, when compared to goods." (Oliver 2000, 252).

Emotions may be more important in customer decisions than previously imagined. Crosby and Johnson (2007), in a meta-analysis study, illustrate the importance of emotions in customer loyalty behavior. Investigating approximately 120 case studies from across the globe they empirically demonstrate emotions are more important than rational motivations in customer loyalty. Their findings extend not only to the "business to consumer" market but also the "business to business" market, a market often characterized as having highly rational buying motivations. Research involving individuals without the portion of the brain which produces emotions (due to injury) suggests consumers cannot make decisions without emotions. Individuals in this state, although capable of rationally describing pros and cons of the situation, are unable to make decisions about what to do when confronted with tasks involving clear choices about what should be done (Crosby and Johnson 2007).

Research also suggests negative incidents have more impact on satisfaction judgments than positive ones (e.g. Anderson and Sullivan 1993). Levitt (1986) claims service customers often don't realize what they are getting until they don't and for this reason "only on dissatisfaction does he dwell" (105). To illustrate, how many cell phone customers call their provider to offer praise or simply turn to friends with unsolicited accolades about the firm and its service? After all cell-phone service is truly amazing if you stop and think about it. On the other hand what happens if a cell phone breaks down or service is interrupted? At this point, due to its absence, customers become cognizant of the service they were once receiving. As probably discerned, many such customers will contact their provider directly to express dissatisfaction or turn to those nearby and offer a few choice comments of the "less than positive" variety. Negative incidents are simply more disconfirming; customers expect the product/service to perform well otherwise it is unlikely they would have purchased it. Attribution research also helps explain why negative incidents have more impact on customers. The fundamental attribution error is the tendency for individuals to take credit for good things and blame others for bad things (Oliver 2000). For the customer satisfaction field one particularly relevant aspect of this research is the internal/external dimension of assigning causality; whether the outcome is attributed to something internal (within the person) or external (outside the person). Research shows overwhelmingly that individuals are likely to blame others (e.g. service providers) when negative incidents occur (Oliver 1997). To illustrate using universities as the service provider, when students perform well on an exam (a good thing) to what do they attribute performing well to? Common reasons for such an outcome include because they're smart, they studied hard, or they learned the material (internal reasons). When students perform poorly (a bad thing) to what do they attribute that outcome to? As those in higher education know all too well, likely reasons include the exam was too hard, there was not enough time, or the professor asked unfair questions (external reasons).

TABLE A: Regression Analysis of Student Performance Ratings

Independent Variable	Beta	Standard Error	Significance Level
Objectives Made Clear	.108	.040	.007
Positive Attitude Toward Students	.093	.039	.019
Being Fair	.119	.031	.000

Dependent Variable: Three-Item Overall Satisfaction Measure

TABLE B: Regression Analysis of Student Performance Ratings Completely Satisfied Versus Others

Completely Satisfied Customers $\mu = 3.96$ (n=205)

Independent Variable	Beta	Standard Error	Significance Level
Objectives Made Clear	.032	.014	.020
Acting In A Professional Manner	-.026	.013	.046
Enthusiastic Toward Subject	.044	.018	.017
Being Fair	.022	.010	.037

Dependent Variable: Three-Item Overall Satisfaction Measure

Others $\mu = 2.71$ (n=217)

Independent Variable	Beta	Standard Error	Significance Level
Receptive To Questions	.070	.033	.035
Communicate Knowledge	.090	.041	.029
Enthusiastic Toward Subject	.112	.048	.021
Being Fair	.094	.029	.001

Dependent Variable: Three-Item Overall Satisfaction Measure

Anecdotal evidence of dissatisfaction's greater impact can also be found in a classroom exercise asking students to recall both highly satisfying and highly dissatisfying experiences with firms. Having conducted this exercise numerous times, without fail students more readily recall negative experiences – and many do so vividly and emotionally. While it is common to find students unable to recall a single highly satisfying experience it is rare they can't recall a dissatisfying one and over a ten year time frame not once has a class recalled satisfying experiences more readily than dissatisfying ones. Oliver's (2000) claim that it may be "more critical to avoid service errors than to 'delight' the customer" is profound as dissatisfying incidents have the potential to trigger negative emotional markers that remain with customers long after the event (252).

AN EXPLORATORY EMPIRICAL INVESTIGATION: STUDENT RATINGS

To investigate the role emotions are conceptualized to play in customer satisfaction judgments, exploratory regression analysis was performed on archival student (customer) evaluations of instructor performance. The survey asked students to rate 15 performance items and three satisfaction items (see Appendix A for a partial representation of the survey instrument). Over 400 individual student ratings of teaching performance, collected over a seven year time frame across several different courses, were analyzed. Regression analysis reveals the prediction equation is significant ($F=19.994$, $p=.000$, Adjusted $R^2=.404$) and three performance items are statistically significant at the .05 level or lower in predicting overall satisfaction (a three-item summary measure, Cronbach's Alpha = .936). As shown in Table A the item explaining the most variation in student satisfaction ratings is one of the fundamental new emotional additions to the customer satisfaction model; fairness.

Given the literature reviewed previously, to further this exploratory investigation the data set was divided into two groups – those *completely* satisfied (n=205, $\mu = 3.96$; scale 1-4) and the rest (n=217, $\mu = 2.71$; scale 1-4). Table B shows the regression analysis results for both groups (both equations are significant; $F=3.760$, $p=.000$, Adjusted $R^2=.169$ and $F=9.343$, $p=.000$, Adjusted $R^2=.367$ respectively). As illustrated the performance item fairness is significant in both equations but weighted approximately four times more for the group containing dissatisfied customers (beta = .022 versus .094 respectively). Fairness perceptions as a predictor of satisfaction have considerably less influence for the highly satisfied group than for the group containing dissatisfied customers. Suggesting, as others have indicated, negative incidents (perceptions of being "less fair"; $\mu = 7.17$, scale 1-9) have more impact on overall satisfaction than do positive incidents (perceptions of being "fair"; $\mu = 8.43$, scale 1-9 $\{t = 9.59, p = .000\}$).

And while these empirical results support both the literature and antidotal evidence offered, due to the exploratory nature of this work, caution should be exercised generalizing the findings beyond the scope of this research.

IMPLICATIONS OF EMOTIONS IN CUSTOMER SATISFACTION

With emotions as one part of customer satisfaction judgments, practitioners need to educate employees, especially front-line employees, about the role emotions play. Delivering a product or service that exceeds customer expectations does not guarantee a satisfied customer. Customers also make judgments about how they were treated (fairness) and why employees acted the way they did (attributions). Independent of product/service performance, customer interactions lead to positive or negative emotional markers. The tried and true practitioner adage "customers don't care how much you know until they know how much you care" takes on additional significance with emotions as part of the customer satisfaction equation. With quality products/services often described as the "ante" to get into today's competitive game and with most organizations performing well in that domain, one implication is such firms can benefit by focusing on the emotional elements. Emotions in customer experiences should be managed with the same focus brought to bear on managing products and services; emotional connections between companies and customers are difficult for competitors to break (Berry, Carbone, and Haeckel 2002). Interactions with personnel, those resulting in positive emotional markers, are one key to *completely* satisfying customers.

Finding, hiring and training customer-focused employees — those truly interested in and empowered to serve and satisfy customers — is important. Employees with the ability to put themselves in their customers' shoes; to be empathetic, are foundational. A *Harvard Business Review* study identified empathy in salespeople, a group with lots of customer interactions, as one of the two key qualities of sales success (Mayer and Greenberg 2006). Using current customers to help select employees they relate to can help build a customer-focused workforce. Group interviewing techniques where candidates are observed to study their reactions to other candidates can also be helpful. Candidates that watch, listen, and seem eager to learn about others as opposed to those reviewing their own résumés, preparing responses, or basically being inattentive to others are likely to transfer those skills to the workplace. As one service provider suggests; hire nice people (Rosenbluth and Peters 2002).

With negative incidents being more impactful than positive ones, practitioners need to design systems and processes that pay special attention to minimizing the potential for such incidents. Unfortunately many organizational systems are designed for the organization's convenience rather than the customer's. Investigating how customers interact with an organization from the "customer view" can help identify areas with the potential for negative encounters. One tool to do this is an "experience audit" in which customers are video-taped in the buying environment so body language, gestures, and facial expressions can be analyzed. Additionally, using follow-up in-depth interviews to determine how customers *feel* about different aspects of the experience can be used to better understand the multiple emotional influences in customer-firm interactions (Berry, Carbone, and Haeckel 2002).

Training about the fundamental attribution error and the likelihood customers will attribute (correctly or incorrectly) the causes of negative incidents to the service provider is needed. In many instances practitioners will not be given the benefit of the doubt, customers will attribute negative outcomes to the provider unless offered other viable explanations. Of course such explanations should be "customer-focused." And because employees themselves are not exempt from the fundamental attribution error, without proper training employees are likely to blame customers for negative outcomes while the customer is blaming them. Such situations can lead to unwanted heightened negative emotional reactions in the customer satisfaction equation.

Current satisfaction instruments also need to include measurements of relevant emotional items. It is the exception rather than the rule to find customer satisfaction measurement tools containing items beyond traditional "rational" (cognitive) elements of product/service performance. And those that measure other "softer" elements of customer-employee interactions probably don't measure the emotional markers attached to them. Academicians need to continue research related to emotions in customer satisfaction responses including attributions and fairness judgments applicable to consumption-related encounters. This will not only help practitioners better understand how to satisfy customers but also lead to new measurement tools that help tap emotional items.

CONCLUSION

From a customer point of view — customer satisfaction is, and always has been, relatively straightforward. Customers know whether or not they are satisfied. Conceptually things are a bit more complicated. As this article illustrates, researchers today recognize and conceptually explain both cognitive and emotional elements in customer satisfaction judgments. In addition to product/service performance, emotional markers associated with disconfirmation, attributions, and fairness discrepancy judgments influence customer satisfaction. Those primarily concerned with performing well on the rational/cognitive elements believe delivering such items will deliver high customer satisfaction — yet that's only half the story. The role of emotions cannot be ignored in customer satisfaction judgments.

Years ago a *Journal of Services Marketing* commentary by Bill Bluel contained an intriguing observation about customer satisfaction. Bluel (1990) observed that "(e)xperience tells me that when I deal with a dissatisfied customer, I can undo all the things that the customer says caused the dissatisfaction without creating a satisfied customer" (49). One can assume others, specifically those dealing with customers on a daily basis, have made similar frustrating observations. When inevitable problems occur, even practitioners doing their best to rectify such problems often find that's not enough. Of course

simply "undoing" things that caused dissatisfaction does not address the underlying emotional markers already enabled. In one respect the emotional damage has been done. Replacing a defective product does not undo the resentment or anger a customer might feel (after all, compared to others, the customer was required to spend additional time/effort to obtain the product). Customer emotions also need to be addressed.

Understanding emotions in customer responses in general, and customer satisfaction specifically, is positioned to be one of the most significant marketing breakthroughs of this decade and perhaps for decades to come. Evidence of emotion's growing importance can be found in the variety of recent books published on the subject (e.g. *Emotion Marketing: The Hallmark Way of Winning Customers for Life, Effective Customer Relationship Management: How Emotion Drives Sustainable Success, Emotional Value: Creating Strong Bonds with Your Customers, The DNA of Customer Experience: How Emotions Drive Value*). Evidently practitioners and academicians agree on something else — emotions are an important and growing part of the customer response equation. While there is much to learn before uncovering the full impact emotions have in customer satisfaction judgments one thing is certain. Customer satisfaction is a feeling — and oh what a feeling it is.

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APPENDIX A: SURVEY ITEMS

Following is a partial representation of the survey tool used to collect instructor performance and customer satisfaction ratings.

Instructor Performance Rating Items:

When it comes to the instructor:	My Perception of the *Instructor's Performance* Is: Low								High
1. making objectives/goals/purposes of the course clear:	1	2	3	4	5	6	7	8	9
2. being prepared for class:	1	2	3	4	5	6	7	8	9
3. acting in a professional manner:	1	2	3	4	5	6	7	8	9
4. being available for consultation:	1	2	3	4	5	6	7	8	9
5. being well organized for class:	1	2	3	4	5	6	7	8	9
6. using examples/illustrations to help clarify course material:	1	2	3	4	5	6	7	8	9
7. returning exams, quizzes, etc. within the time stated:	1	2	3	4	5	6	7	8	9
8. providing feedback useful in keeping me informed of my progress in the course:	1	2	3	4	5	6	7	8	9
9. being receptive to questions:	1	2	3	4	5	6	7	8	9
10. providing appropriate learning experiences:	1	2	3	4	5	6	7	8	9
11. communicating a high degree of subject matter knowledge:	1	2	3	4	5	6	7	8	9
12. being enthusiastic toward the subject:	1	2	3	4	5	6	7	8	9
13. exhibiting a positive attitude toward students:	1	2	3	4	5	6	7	8	9
14. exhibiting a positive attitude toward learning:	1	2	3	4	5	6	7	8	9
15. being fair:	1	2	3	4	5	6	7	8	9

Student Satisfaction Rating Items:

	Strongly Disagree			Strongly Agree
1. If given the opportunity, I would take a class from this instructor again:	1	2	3	4
2. Overall, I was satisfied with the instruction received in this class:	1	2	3	4
3. I would recommend this instructor to a friend:	1	2	3	4

Midwestern Business and Economic Review

Manuscript Submission Guidelines

The *Midwestern Business and Economic Review* invites submission of original manuscripts and research by individuals in the public and private sector in the areas of economics and business administration. Of particular interest are topics dealing with issues relevant to Texas and the Southwestern United States. Each manuscript submitted is anonymously reviewed by members of the Editorial Review Board and *ad hoc* reviewers as needed. To meet the interest of a broad spectrum of the academic and business community, readability and expository clarity are considered essential in the review process.

All manuscripts submitted for review must meet the following guidelines

- The manuscript should be doubled spaced, 12 point Times New Roman, with 1" margins, and should not exceed fifteen pages, excluding tables, figures, and references
- The first page should include the title of the article and an abstract 50-75 words in length
- Endnotes are preferred over footnotes
- References should follow the *American Psychological Association* guidelines
- All tables and figures should be included on separate pages

A cover letter should be included with the submission containing the following:

- Title of the manuscript
- Name, degree, rank, and affiliation of each author
- Contact information for each author (mailing address, telephone number, and email address)

Four copies of each manuscript must be accompanied by a PC compatible electronic copy of the manuscript formatted in Microsoft® Word or rich-text (RTF) formats.

All manuscripts should be submitted to:

Editor, *Midwestern Business and Economic Review*
Bureau of Business and Government Research
Midwestern State University
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Wichita Falls, Texas 76308-2099

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