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A MESSAGE FROM THE CO-EDITORS

It is with great pleasure that we welcome you to this issue of the *Journal of International Business Research*, the journal of the Academy for the Study of International Business, an affiliate of Allied Academies, whose mission is to support the exchange of ideas and insights in International Business.

This issue features the best papers among those presented at the ICBEIT 2012 Ho Chi Minh City International Conference on Business, Economics and Information Technology on the theme of "Doing Business in the Global Economy: Economic, Political, Social, Cultural and Technological Environments Facing Business". Founded on a very simple idea, that there is so much we can learn from each other, the above conference provided an opportunity for academicians, researchers, students, and representatives from industry and government to get together and exchange ideas in the spirit of scholarship and professional growth.

We thank the University of Guam's School of Business and Public Administration and Penn State Altoona's Division of Business and Engineering for their support of the publication of this journal issue. We also acknowledge the members of Allied Academies' Editorial Review Board for their collegiality and service to our profession. Additionally, we are grateful to the Academy for providing us with the outlet through which we can share our scholarly efforts with those interested in the study of International Business.

Consistent with the editorial practice of the Academy on all 18 journals it publishes, each paper in this issue has undergone a double-blind, peer-review process.

This issue includes papers by authors from Indonesia, Japan, Korea, Philippines, Vietnam, Continental U.S. and the Island of Guam, thus reflecting the international reach of Allied Academies and the diversity of its membership.

Information about the Allied Academies, the *JIBR*, and the other journals published by the Academy, as well as calls for conferences, are published on our website. In addition, we keep the website updated with the latest activities of the organization. Please visit our site and know that we welcome hearing from you at any time.

From the Co-Editors,

Dr. Maria Claret M. Ruane, University of Guam

Dr. Barbara A. Wiens-Tuers, Pennsylvania State University-Altoona

AN ANALYSIS OF THE ANTIBIOTIC INDUSTRY: AN INNOVATOR'S DILEMMA?

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ABSTRACT

With the decreasing effectiveness of antibiotics and increasing prevalence of antibiotic resistant bacteria across countries, pharmaceutical companies now face a dilemma of neglecting or investing in antibiotic research and development. On the other hand, some entrepreneurial companies are engaging in the development and commercialization of phage therapy, a potential alternative to antibiotics that was discovered earlier than antibiotics and of which use has persisted in Eastern Europe. This study analyzes the development of antibiotics and phage therapy, and captures the current state of play in the antibiotics industry. It also examines the perceived value of antibiotics and phage therapy through a questionnaire-based survey of companies, medical doctors, and researchers in Japan. While we found scientific evidences supporting the use of phage therapy, the survey findings indicated low perceived value of phage therapy. These findings offer managerial implications for businesses in the antibiotic industry.

INTRODUCTION

The increasing prevalence of antibiotic resistant bacteria is one of the most serious health problems of today that places a significant burden on health care systems. This problem has led to the entrance of new players in the pharmaceutical industry, engaging in the research and development (R&D) of antibiotics and other cure to bacterial infections. While large companies are finding antibiotics R&D not competitively rewarding, some small companies are gaining interest in the R&D of new antibiotics and some entrepreneurial companies are embarking on the R&D of phage therapy, which is the most promising alternative to antibiotics (Joerger, 2003). In light of the issue, this study reviews the development of antibiotics and phage therapy, and examines the changing business landscape of antibiotics. In order to assess the perceived value of antibiotics and phage therapy, this study conducts a questionnaire-based survey of different stakeholders such as companies, medical doctors, and researchers in Japan.

The rest of the paper is structured as follows. The following section provides a background on the problem of antibiotic resistance. The third section analyzes the antibiotic industry to capture the current state of play in the industry. This section also discusses the findings on the perceived value of antibiotics and phage therapy. The last section discusses the managerial and policy implications, and conclusions of the study.

BACKGROUND

The problem of antibiotic resistance is not new. Resistance to antibiotics such as penicillin and streptomycin were recognized soon after their discovery in the 1940's (Levy & Marshall, 2004). Nevertheless, the resistance problem was perceived then as of a little health problem by some, particularly those in developed countries. However, the increasing prevalence of resistant bacterial strains and cases of failed treatment of bacterial infections using antibiotics are now becoming a serious threat to global public health. Resistant bacterial infections cause the death of about 25, 000 hospital patients in the European Union and 100,000 in the U.S. a year, and add more than $34 billion and at least €1.5 billion extra cost to the U.S. and EU health care system, respectively (Högberg, Heddini, & Cars, 2010; Waters, 2011). Diseases that were thought to be controlled by antibiotics are at risk of becoming untreatable. Gonorrhea, which is the second-most common communicable disease in the U.S., is becoming increasingly resistant to antibiotics; the prevalence of its resistance has increased by 16 fold, from 0.1 percent in 2006 to 1.7 percent in 2011 (Conley, 2012). In addition, a new, untreatable strain of gonorrhea has been discovered in Japan that could swiftly spread resistance unless new drugs or effective treatment programs are developed (Blue, 2011). Infectious diseases such as malaria, pneumonia, and tuberculosis that were previously treatable now cause the greatest number of deaths in developing countries (Byarugaba, 2005). As noted by the founder and chairman of the Asia Pacific Foundation for Infectious Diseases, "Antibiotic resistance is one of the most serious health threats of the 21st century and Asian countries are clearly an epicenter when it comes to antibiotic resistance..." (Yun, 2011).

Since antibiotics have remained to be the main treatment for bacterial infection, such increasing incidence of antibiotic resistance is of major concern (Erb, Sturmer, & Brenner, 2007). The situation continues to worsen due to overuse and misuse of antibiotics. Businessweek (2011) reports that from 2006 to 2008, in more than 1 in 5 cases doctors prescribed young patients antibiotics, and 23 percent of the time, the prescriptions were for illness that cannot be cured by antibiotics including asthma, or colds caused by a virus. Furthermore, there is a substantial decline in antibiotics R&D (Högberg et al., 2010). This is partly due to the growing problem of antibiotic resistance that has made investments in antibiotics R&D less attractive for many, particularly large, pharmaceutical companies (Nathan & Goldberg, 2005). This issue will be further discussed below.

THE ANTIBIOTIC INDUSTRY

Antibiotics as the Mainstream

Antibiotics are the widely known treatment against bacterial diseases. The first antibiotic, penicillin, was discovered in 1929 and in 1940's, the mass production of antibiotics started. When first introduced, antibiotics were hailed as the "magic bullet" that can kill bacteria, the infectious agents, without harming the patients (Humphrey, 2008). Their discovery has revolutionized medicine and saved countless lives. Based on their remarkable success, US Surgeon General William H. Stewart announced in 1969 that "It is time to close the book on infectious diseases. The war against pestilence is over" (as quoted in Häusler (2006), p.15). Moreover, under the protection of effective antibiotics,

many medical interventions including surgery, transplantations, aggressive treatment of cancer, and advanced intensive care procedures have been developed and made possible (Högberg et al., 2010).

Since their discovery, the consumption of antibiotics has rocketed globally and antibiotics have been a blockbuster business. In 2007, Pfizer's Zyvox and GlaxoSmithKline's Augmentin garnered sales of $944 million and about $1 billion, respectively (Pray, 2008). In 2009, the world-wide sales of antibiotics totaled $42 billion, accounting for the 5% of the global pharmaceutical market (Hamad, 2010). According to IMS Health, 76.1 million prescriptions of penicillin were issued in the U.S. in 2010. Nonetheless, the antibiotics market is maturing; its average annual growth has been 4%, in contrast to a 16.7% growth for antiviral drug (Hamad, 2010). It has become less attractive compared to markets for drugs against chronic diseases. For example, the U.S. combined sales of the top five antibiotics were $6 billion in 2010, whereas Pfizer Inc.'s Lipitor , a cholesterol pill that reduces the chances of a heart attack, generated $5.3 billion in U.S. sales (Waters, 2011).

The antibiotics market also faces a rapid decline in R&D. Between 1980 and 2003, only two new classes of antibiotics had been developed: oxazolidinones (Pfizer's Zyvox), which is expected to lose patent protection in 2016, and lipopeptides (Cubist's Cubicin) (Hogberg, 2010). Since 2006, among 111 drugs approved by Food and Drug Administration (FDA) in the US, only three were antibiotics (Waters, 2011). This shortfall in antibiotic R&D has been attributed to the continual emergence and spread of antibiotic resistance. The growth in antibiotic resistance threatens the long-term efficacy and hence the market-life of antibiotics (Hogberg, 2010). Additionally, there has been a strong pressure against the use of antibiotics since several studies have documented evidences on the strong positive correlations between antibiotic consumption and antibiotic resistance (Byarugaba, 2005). Doctors are now advised to limit antibiotic treatment to reduce the spread of antibiotic resistance. As a result, the consumption rate of antibiotics has decreased in several countries. For instance, the consumption rate of antibiotics between 2000 and 2009 has declined by 21% and 15% in France and Japan, respectively (Hamad, 2010). This trend takes the incentives away for pharmaceutical companies to engage in antibiotic R&D.

Although the profit margin is lower than that of drugs for chronic diseases such as cancer and heart failures, which now drive the investments of most large pharmaceutical companies, antibiotic R&D requires fewer resources that small companies can afford. Hence, while the antibiotic resistance has 'closed the book' for antibiotic R&D in some large pharmaceutical companies, it opens up opportunities for small biotech companies (Waters, 2011). Optimer Pharmaceutical Inc. may receive U.S. approval by May 30, 2012 to sell Dificid, an antibiotic that fights against stomach infection and is found better at preventing recurrences than existing medications. Trius Therapeutics Inc. that is likely to gain approval for its antibiotic torezolid against skin infections will compete with Pfizer's Zyvox, an 11-year-old drug that has created new drug-resistant infectious bacterial strains. Along with Optimer Pharmaceutical Inc. and Trius Therapeutics Inc., Medicines Co., Paratek Pharmaceuticals Inc., and Durata Therapeutics are also in final testing of new antibiotics that may gain approval by 2014. While these biotech companies are new players in the antibiotics market, Cubist has been committed to antibiotic R&D since its development and commercialization of Cubicin in 2003 and is also now in final testing of antibiotic CXA- 201, which targets pneumonia, abdominal, urinary tract infections, and other infections caused by multidrug-resistant bacteria. These new antibiotics are expected to generate a

revenue under $1 billion, attractive enough for small biotech companies but not for large pharmaceutical companies.

Phage Therapy as a Potential Alternative to Antibiotics

The increasing prevalence of antibiotic resistance has also led to a renewed and growing attention to phage therapy, a potential alternative to antibiotics that uses viruses to infect and kill bacteria. Phage therapy is not new. It was first discovered in 1915 earlier than the discovery of antibiotics in 1929. The discovery of phage therapy engendered high optimism and expectations regarding their therapeutic potential (Sulakvelidze, 2005), powered by a report of the British medical officer Lieutenant Colonel Morison about the success of using phage therapy against cholera outbreak in India from 1930 to 1935 (Merril, Scholl, & Adhya, 2003). In the 1930s, the large pharmaceutical company Eli Lilly & Co. produced at least seven phage products for the treatment of bacterial infections (Sulakvelidze & Kutter, 2005). However, the efficacy of its products was questioned and in 1939, the American Medical Association's Council on Pharmacy and Chemistry concluded that phage therapy was of questionable value (Housby & Mann, 2009). Due to inadequate understanding of phage biology and imperfections in diagnostic bacteriology techniques at the time, several early phage therapy studies failed (Sulakvelidze, 2005). Additionally, most of the phage therapy researchers' works are published in Russian and Georgian journals, limiting the access by other specialists in the field (Häusler, 2008). Moreover, the commercialization of antibiotics in 1940s overshadowed phage therapy and led to the abandonment of phage therapy in the West.

Despite of its early failure, phage therapy has persisted without interruption in Eastern Europe, particularly in centers such as the Eliava Institute of Bacteriophage, Microbiology and Virology under authority of the Ministry of Science and Education in Tbilisi, Georgia and the Institute of Immunology and Experimental Therapy in Wroclaw, Poland (Housby & Mann, 2009). In addition, Phage Therapy Center, which is located in Georgia and bought by a U.S. firm called Phage International, uses phage therapy to treat patients with acute and chronic bacterial infections including antibiotic-resistant infections. A number of biotech companies are also now engaged in the commercialization of phage products and phage therapy R&D including JSC Biochimpharm, Biopharm L Limited, BioControl, Gangagen, Novolytics, Intralytix, Phage-Biotech and Viridax (see Housby & Mann, 2009, for the status of phage product development of each company).

Unlike antibiotics that eradicate a broader range of bacteria including beneficial bacteria, phage therapy specifically targets the bacteria causing infections and thus does not harm beneficial bacteria in the body. As a result, there has been no report of significant adverse reactions or side effects with the administration of phage therapy to humans (See Häusler, 2006, for a comprehensive list of advantages and disadvantages of phage therapy). Phage therapy could be used to treat infections caused by multi-drug resistant bacteria (Matsuzaki et al., 2005; Maura & Debarbieux, 2011; Pirisi, 2000; Skurnik, Pajunen, & Kiljunen, 2007). In fact, the Phage Therapy Center reports a success rate of over 90% in treating bacterial infections that do not respond to conventional antibotic treatment. Another often cited advantage of phage therapy over antibiotics is that developing a phage system costs less than that of developing a new antibiotic (Skurnik et al., 2007). In addition, the cost of treating multidrug-resistant bacterial infections using phage therapy is lower than that of using antibiotics. Miedzybrodzki et al.

(2007) show that for the therapy of multidrug-resistant staphylococus infection, the cost of using phage therapy in Poland is about half the cost of 10-day therapy with vancomycin, the least expensive antibiotic, and several times less compared with other antibiotics. Moreover, based on the findings of Miedzybrodzki et al. (2007) and Zahedi (2007), the therapy of Multi-resistant Staphylococcus Aureus (MRSA) infections using phage preparations lasts on average 5 weeks and its total cost is about $670, whereas using antibiotics, the length of therapy is about 6 weeks and costs between $2,520 (using vancomycin) and $8,000 (using Zyvox). Hence, in contrast to the conclusion of the American Medical Association's Council on Pharmacy and Chemistry in 1939, phage therapy may be of great clinical value.

A critical challenge to phage therapy is the regulative environment. The current regulatory system requires every phage-bacteria combination to go through a multi-year clinical trials by which time the phage and bacteria may have evolved (Kantor, 2006). As argued by Betty Kutter, a phage researcher at Evergreen State College, "Our whole regulatory environment has been one major thing that has slowed people down" (Svoboda, 2009). Nonetheless, the U.S. FDA's approval of Intralytix Incorporated's LMP-102 phage spray that can be used to keep meat and ready-to-eat foods free from Listeria bacteria, a common source of food poisoning (Housby & Mann, 2009), signals hope for phage therapy.

Concerns on Antibiotic Resistance and Perceived Value of Antibiotics and Phage Therapy in Japan

Next to the USA and UK, Japan is well known to become self-sufficient in penicillin manufacture as early as in 1948 (Venkatesh, Bairavi, & Sasikumar, 2011). By the mid-1980s, antibiotics developed in Japan including kanamycin, bleomycin, piperacillin, norfloxacin, and meropenem accounted for the 20% of the $5 billion US antibiotics market (Umemura, 2011). Nonetheless, just like other countries, Japan also faces the problem of antibiotic resistance. Over 50% of clinical *Staphylococus aureus* strains are now multidrug resistant (Merril et al., 2003) and recently, a new, untreatable strain of gonorrhea has been discovered in Japan (Blue, 2011). The Japanese pharmaceutical industry has also opened its doors to phage therapy. Wako, a Japanese pharmaceutical company, has signed up an agreement with Special Phage Services, a Sydney-based company, to investigate the potential market for phage therapy in Japan (McDonald, 2007).

In the previous sections, we have discussed the problem of antibiotic resistance and the current state of play in the antibiotics industry. In this section, we will address fundamental issues with a focus on Japan: Are Japanese concerned about antibiotic resistance? How do Japanese perceive the value of antibiotics and phage therapy? In order to answer these questions, we performed a questionnaire-based survey of companies, medical doctors, and researchers in Japan. These different groups of respondents were selected on the basis of their significance to the R&D and diffusion of antibiotics and phage therapy. For the company survey, pharmaceutical companies were identified as member companies of the Japan Pharmaceutical Manufacturers Association and from the Complete Guide to Bio Venture published by Nikkei Business Publications, Inc. The CEO or manager of each company completed the questionnaire. For the physician survey, the respondents were identified as specialists in internal medicine who treat patients with bacterial infection-related diseases in national university-affiliated hospitals. For the researcher survey, the respondents were identified through the database of Grants-in-aid for Scientific Research who research in the area of pharmacy, internal medicine, and bacteriology.

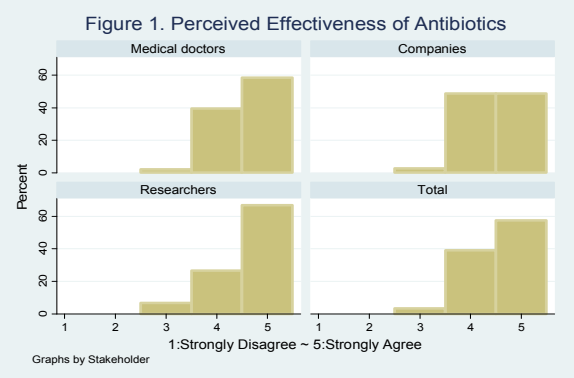
To enhance the content validity, the questionnaire was reviewed and then pilot-tested using Japanese academic researchers with expertise in survey methodology and antibiotics/phage therapy. The questionnaires were then distributed to companies and physicians by post and to researchers by e-mail with a response rate of 24% and 11%, respectively. Respondents were asked to indicate the extent of their agreement with each item in the questionnaire on a five point numerical scale, ranging from 1-strongly disagree to 5-strongly agree. A total of 120 surveys were completed, and the final analysis included 37 companies, 48 medical doctors, and 30 researchers, yielding a total of 115 samples.

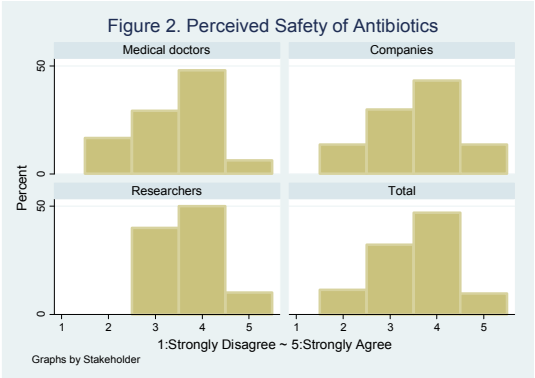
Table 1 presents the level of concern about antibiotic resistance among medical doctors, companies and researchers. Although only 40 percent of company respondents indicate their personal concern about antibiotic resistance, at least 85 percent of medical doctors and researchers indicate their personal concern. In addition, at least 75 percent of medical doctors, researchers and companies believe that people in Japan are concerned about antibiotic resistance.

Table 1: Concern about Antibiotic Resistance

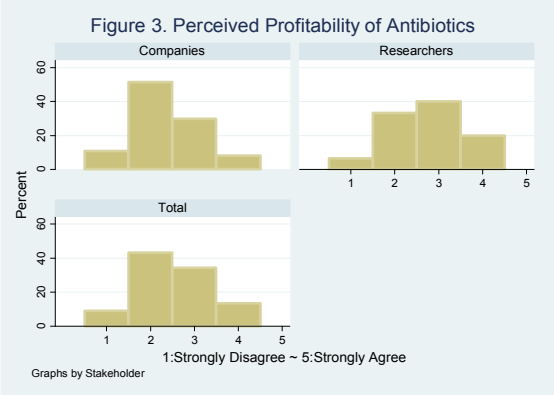
	Medical Doctors		Companies		Researchers	
	Personal	Others	Personal	Others	Personal	Others
1-Strongly Disagree	0.0%	6.3%	10.8%	2.7%	0.0%	0.0%
2-Disagree	4.2%	4.2%	16.2%	0.0%	0.0%	0.0%
3-Disagree Nor Agree	6.3%	16.7%	32.4%	21.6%	3.3%	13.3%
4-Agree	39.6%	37.5%	10.8%	43.2%	43.3%	53.3%
5-Strongly Agree	50.0%	35.4%	29.7%	32.4%	53.3%	33.3%

Figures 1 and 2 illustrate the perceived effectiveness and safety of antibiotics, respectively. While there is a strong consensus that antibiotics are effective against bacterial diseases in figure 1, some are undecided or disagree about the safety of antibiotics, particularly medical doctors (46 percent) in figure 2.





Figures 3 and 4 plot the perceived profitability and cost of antibiotics, respectively. Figure 3 suggests that most respondents disagree about the profitability of antibiotic R&D, particularly pharmaceutical companies. Figure 4 also shows consensus and suggests that most pharmaceutical companies and researchers believe that antibiotic R&D is very costly.



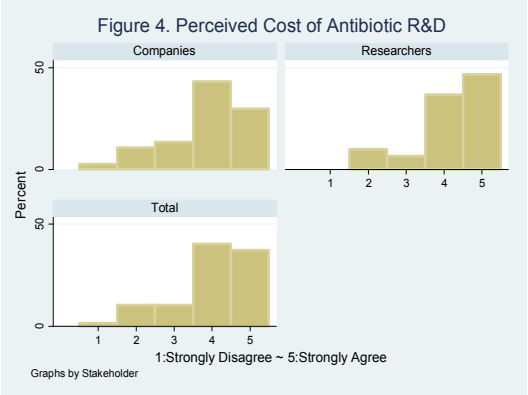
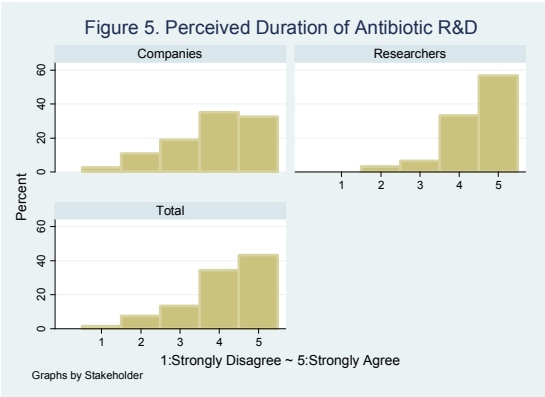


Figure 5 illustrates the perceived duration of antibiotic R&D, indicating that most respondents believe that antibiotic R&D takes time, particularly researchers (90 percent). Figure 6 plots the perceived value of antibiotics by medical doctors. Although a large percentage (about 40 percent) of medical doctors agrees, about 40 percent are unsure and about 20 percent disagree on the affordability and time-saving of antibiotics. Nonetheless, most medical doctors (about 65 percent) believe that antibiotics are easy to administer.



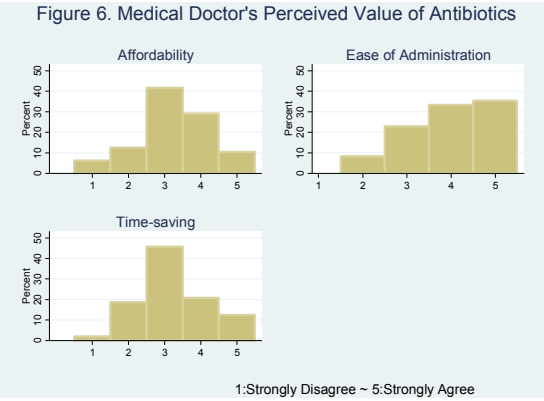
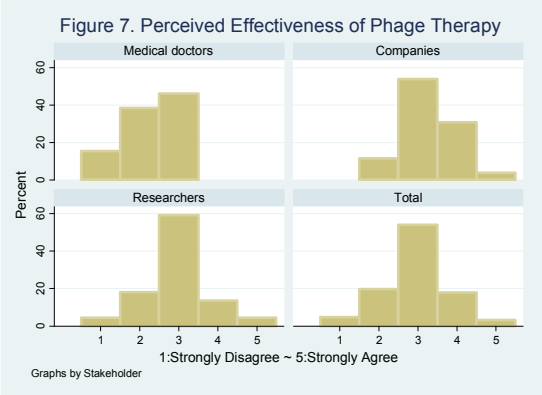


Figure 7 shows that while many respondents are unsure about the effectiveness of phage therapy, the percentage of those who disagree on the safety of phage therapy is higher than those who agree. In addition, while no medical doctor believes that phage therapy is effective against bacterial diseases, 30 percent of pharmaceutical companies agree on the effectiveness of phage therapy. Figure 8 presents the perceived safety of phage therapy and suggests that most medical doctors and researchers disagree about the safety of phage therapy, particularly medical doctors. On the other hand, although most pharmaceutical companies are undecided, the percentage of companies who agree about the safety of phage therapy is slightly higher than those who disagree.



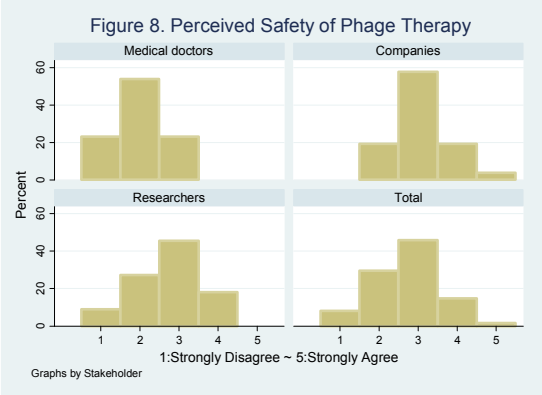
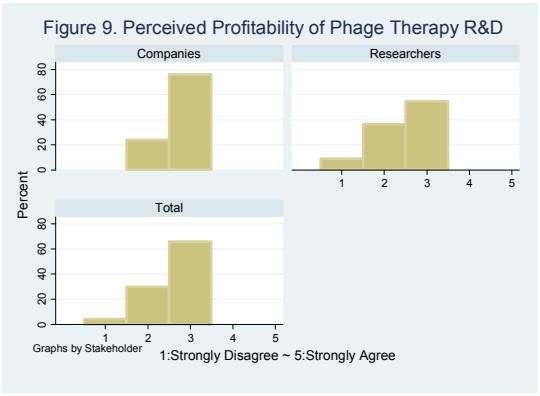


Figure 9 suggests that while most companies and researchers are undecided, none agrees on the profitability of phage therapy R&D. On the other hand, figure 10 shows a lack of consensus among researchers and companies. Among researchers, 28 percent agree, 48 percent are undecided, and 24 percent disagree on the high cost of phage therapy; whereas, among companies, 50 percent agree, 40 percent are undecided and 10 percent disagree.



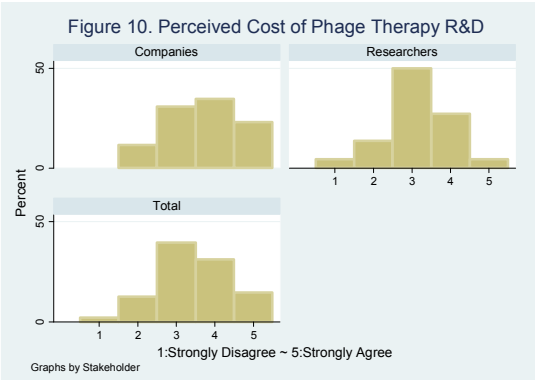
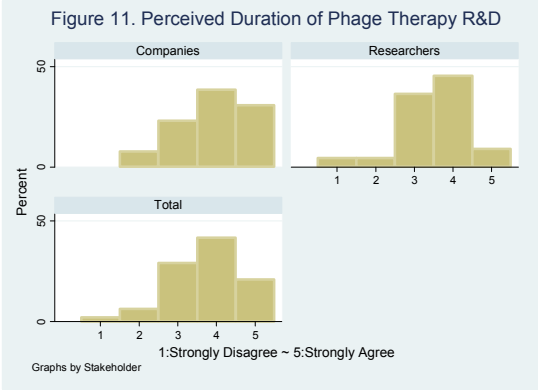
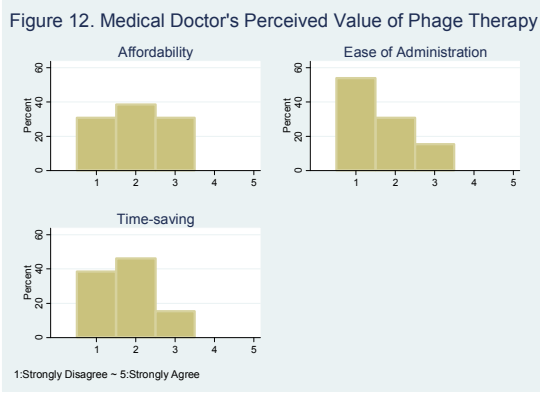


Figure 11 shows that most respondents believe that phage therapy R&D takes time, particularly companies. In addition, figure 12 suggests that most medical doctors believe that phage therapy is unaffordable and difficult to administer, and takes long-term treatment.





In sum, the findings indicate a great concern about antibiotic resistance in Japan. Nonetheless, most medical doctors, companies, and researchers still believe that antibiotics are effective against bacterial diseases, although they also believe that antibiotic R&D is unprofitable, costly and time-consuming. In addition, it seems that some are now unsure or disagree on the safety of antibiotics. On the other hand, more companies, researchers, and medical doctors believe that not only that phage therapy is ineffective; its R&D is unprofitable, costly and time-consuming. It is also important to note that there is a relatively lack of consensus on the perceived value of phage therapy among companies, researchers, and medical doctors. Moreover, medical doctors perceive antibiotics as an affordable, easy-to-administer, and time-saving treatment against bacterial diseases, but not phage therapy, which contrasts the scientific evidences we presented above.

DISCUSSION AND CONCLUSION

The main objective of this study is to examine how the problem of antibiotic resistance is changing the business landscape of the antibiotics industry. Based on the discussion above, it is evident that the increasing incidence of antibiotic resistance adds costs to the health care system and the society. Antibiotics were invented to eradicate bacteria causing infections and death, and have become a massive source of revenue for many, particularly large, pharmaceutical companies. However, the emergence of multidrug-resistant bacteria has curtailed its efficacy and thus market value, driving large pharmaceutical companies away from antibiotic R&D.

Nonetheless, the increasing need for antibiotics against multidrug-resistant bacteria and declining interest of large pharmaceutical companies in antibiotic R&D have opened up opportunities for small biotech companies and lowered barriers to entry in the antibiotic industry. These trends have created a market space for small biotech companies to provide new antibiotics and possibly, an alternative to antibiotics, that is, phage therapy.

Phage therapy was discovered earlier than antibiotics, but its early failures and the phenomenal success of antibiotics led to the abandonment of phage therapy in most countries, except in Eastern Europe. Because antibiotics target a broad spectrum of bacteria, it was easier to mass produce and commercialize than phage therapy that can only target specific bacteria. Nonetheless, the evidences on the advantage of phage therapy over antibiotics provided by several studies may suggest that the abandonment of phage therapy was too soon and that phage therapy could be of clinical as well as of market value. This may pose a dilemma for some companies in the antibiotic industry: invest in the R&D of antibiotics of which value and application are more certain or in the R&D of phage therapy of which value and application are yet uncertain. In the midst of this situation, established pharmaceutical companies should recognize their tendency to ignore new technologies with lower gross margin (Christensen, 1997). Indeed, most companies that are now investing in phage therapy R&D are small, new, companies. Established firms should assess the potential of phage therapy and consider developing strategies for phage therapy R&D.

Although phage therapy could be "the next thing" in the antibiotic industry, our findings on the gap in the actual and perceived performance of phage therapy pose a significant challenge to companies investing in phage therapy R&D. Due to the unfamiliarity with phage therapy, other companies and researchers may be reluctant to collaborate with them, and medical doctors may be

reluctant to use phage therapy to treat patients. Such unfamiliarity and reluctance to the adoption of phage therapy may also be true for regulatory bodies. Thus, to facilitate the development and diffusion of phage therapy, legitimacy-building strategies would be very crucial.

To conclude, this study has analyzed how the problem of antibiotic resistance has changed the business landscape of the antibiotic industry, and found evidences on the potential value of phage therapy. Given the growing incidence of antibiotic resistance, the antibiotic industry may shift away from mass production to niche production of new drugs that target specific bacteria such as narrow (or single)-spectrum antibiotics and phage therapy. Future studies could further examine the trends in the antibiotic industry and adoption of phage therapy across countries.

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THE EFFECT OF GLOBAL FINANCIAL CRISIS ON THE PHILIPPINES' EXPORT SECTOR: A VECTOR AUTO-REGRESSION ANALYSIS

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ABSTRACT

The 2008 Global Financial Crisis (GFC) caused the collapse of large financial institutions around the world; and contributed to the failure of various businesses that led to significant downturns in economic activities. This study assesses the impact of the financial crisis on the Philippine export sector. Using vector auto-regression analysis, we analyze the effect on the Philippine export sector with respect to the changes on the Philippine Gross Domestic Product (GDP), Philippine currency movement in terms of exchange rate from Philippine Peso (PHP) to US Dollar (USD), and change in US GDP and US imports, being US as the major trading partner of the Philippines. This study further determines the performance of Philippine exporters linked with the GFC. Hence, this study derives policy implications on the development of the Philippines' export sector given the external shocks associated with a financial crisis.

Keywords: Global Financial Crisis, Philippine exporters, exchange rate, US GDP, US imports

INTRODUCTION

Participation in international trade is inevitably considered to be a necessity in the aspect of expanding open markets for final and intermediate goods, increasing profits, and achieving economies of scale which all sum up to the increase in economic growth. For instance, China is boosting its exports that paved its transition from being known as a *Sleeping Giant* to its emergence as the second biggest economy in the world. Likewise, the neighboring countries of the Philippines such as Singapore, Taiwan, South Korea, and Hong Kong became the East Asian tiger economies due to their efforts of promoting export-led growth. In the case of the Philippines, export activities, which account to approximately thirty percent of GDP (World Bank Report, 2010), are geared towards tapping the markets of developed countries such as Japan, Netherlands, Hong Kong, South Korea, Singapore, and the United States of America (USA).

The USA has been consistently the major trading partner of the Philippines which marked as the market of about 18 percent of total exports of the country. Semiconductors and other electronic products are considered to be the top products exported by the Philippines to the USA. Furthermore, the Association of Southeast Asian Nations (ASEAN) countries, collectively, are also fortifying its trading relationship with the USA by consistently being one of the top suppliers of its imports and engaging in trading agreement, specifically the US-ASEAN

Trade and Investment Arrangement. Thus, ASEAN countries are able to realize significant economic growth by heavily depending on the market of developed countries, such as the USA.

The adverse effect of the 2008 Global Financial Crisis (GFC) proved to be unconfined within the USA due to interdependence of economies and reliance of other countries, especially of developing ones, to the largest economy of the world. The implication of the collapse of the economy of the USA had also translated the same direction of other countries, merely varying as to the extent of the decline in output or GDP. According to Diokno (2009), "The world economic crisis has affected the Philippine economy in three ways: exports have declined, remittances of Filipino overseas workers have slowed, and foreign direct investments have declined."

Since the Philippines is one of the developing countries that are dependent on import and export commodities, this study measures the impact of the GFC on the Philippine export sector. This study analyzes the effect on the Philippine export sector with respect to the changes on the Philippine Gross Domestic Product (GDP), Philippine currency movement in terms of exchange rate of Philippine Peso (PHP) to US Dollar (USD), and change in US GDP and US imports.

Furthermore, this study determines the performance of Philippine exporters linked with the GFC. Hence, this study aims to derive policy implications on the development of the Philippines export sector given the external shocks associated with a financial crisis.

Given these backdrops, the following specific objectives are set:

- To assess the impact of the Global Financial Crisis on the Philippine export sector;
- To determine the performance of Philippine exporters linked with the Global Financial Crisis;
- To derive policy implications on the development of the Philippine export sector given the external shocks related to a financial crisis.

GLOBAL FINANCIAL CRISIS AND ASEAN COUNTRIES

The 2008 Global Financial Crisis (GFC) caused the collapse of large financial institutions around the world; and contributed to the failure of various businesses that led to significant downturns in economic activities. Sparked by the economic collapse of the United States of America (USA), the GFC was primarily due to the monetary and fiscal policies and sub-prime lending associated with reckless behavior of lenders and borrowers (James & et al, 2008). The meltdown of the USA sub-prime mortgage market, imputable to the decline in the prices of housing and to the lack of liquidity, increased investment risks and consequently resulted in the downfall of investment firms and financial institutions. The financial instability was coupled with predicaments such as instability of currency and crash in the stock markets which further aggravated and depressed the economy of the USA. Furthermore, as an effect of the crisis, the US imports dropped starting from the last quarter of 2007 and recorded a significant decrease in

imports during the first quarter of 2009, recording an staggering annual decline of 34 percent (Bailey & Eliot, 2009).

The financial and economic turmoil in the USA extended to and synchronized with other economies, including the ASEAN member countries, which significantly led to international trade contraction (Yap, J., Reyes, C. & Cuenca, 2009). However, the decline of GDP growth rates of the economies in this region was not associated with the crash of financial sector in this region but it was heavily associated with the sharp decline in export activities due to the decrease in world demand. The lower demands are especially from their primary markets such as the USA, Japan and Europe.

As measured by Asian Development Bank (ADB), East Asian economies experienced a slowdown in terms of GDP growth rate, some even experiencing negative growth rates. According to Yap, et. al (2009), "The 2009 first and second quarter year-on-year GDP growth rates of major East Asian economies are as follows: China: 6.1 percent, 7.9 percent, Indonesia: 4.4 percent, 4percent; Malaysia: -6.2, -3.9percentpercent; Japan: -8.7percent, -7.2percent; Korea: -4.3 percent, -2.7 percent; Philippines: 0.6 percent, 1.5 percent; Singapore: -9.5 percent, -3.5 percent; Thailand: -7.1 percent, -4.9;Vietnam: 3.1 percent, 4.1 percent.

In the case of the Philippines, the country was not spared of the effects of the crisis since it also experienced a deceleration in growth. As measured, the GDP fell significantly during 2008 which recorded a growth rate of only 3.8 percent from the GDP growth rate of 7.1 percent in 2007. Moreover, the exports of the country to the USA have significantly declined during this period by 16 percent in 2008 (Yap, et. al., 2009).

The interdependence of countries due to globalization also caused a contagion effect during the global financial crisis. The openness of a country readily determines the magnitude of the effects of external forces and phenomenon since the level of openness indicates the volatility to shocks, especially to trading partners. Thus, due to the increasing interaction of ASEAN countries to the USA in terms of trade, this region became more exposed to the contagious economic disease of the USA.

Generally viewed and at a global level, a hypothetical but quite realistic 20 percent drop in ASEAN's imports in 2009 would remove USD150 billion or more from the demand for products from the rest of the world (Perkins, 2009). Hence, stated differently, a 20 percent drop in world demand for ASEAN's exports would be equivalent to a 15 percent drop in ASEAN total gross national products (Perkins, 2009).

METHODOLOGY

Vector Autoregression

This study utilized a Vector Autoregressive (VAR) model, culled from Rivera and See (2009), to analyze the effect of the Global Financial Crisis on the Philippine export sector. The model is used to portray the time path of the dependent variable in relation to its prior period values (Gujarati & Porter, 2009). This type of model generalizes the univariate autoregressive model to dynamic multivariate time series in analyzing the dynamic behavior of the time series

variables considering the lagged values of both the dependent and explanatory variables (Enders, 2004 cited in Rivera & See, 2009).

To examine the effects of shocks to the performance of Philippine export sector as a result of the Global Financial Crisis, we implement the Reduced Form VAR approach in the form of the equation expressed as:

$$Y_t = A_0 + \sum_{k=1}^{p} A_k \, Y_{t-k} + \varepsilon_t \qquad (1)$$

where Y_t is a vector of *n* variables, A_0 is an *n* x 1 vector of constant terms, A_k is an *n* x *n* matrix of coefficients, ε_t is an *n* x 1 vector of stochastic error terms, and *p* is the order of autoregression. The lag order of the VAR (*p*) is set such that the error terms are serially uncorrelated.

The equation states the current value of each *m* series as a weighted average of all the series in the past plus a stochastic term, ε_t, representing other factors that are not explicit in the model but affect the series.

The interpretation of the VAR (*p*) shown by Equation (1) is normally based on its moving average representation. Moreover, further substitution and rearranging of a moving average represented by Equation (1) is expressed as:

$$Y_t = B_0 + \sum_{k=1}^{q} B_k \, \varepsilon_{t-k} + \varepsilon_t \qquad (2)$$

where Y_t is a vector of *n* variables, B_0 is an *n* x 1 vector of constant terms, B_k is an *n* x *n* matrix of coefficients, ε_t is an *n* x 1 vector of error terms, and *q* is the moving average order. The lag order of the VAR (*q*) is set such that the stochastic disturbance terms are non- auto correlated.

We estimate the A_0 and B_0 variables after the specification of the length of the lag k (Gujarati and Porter, 2009). For this purpose, we choose the model that gives the lowest values using the Akaike Information Criterion (AIC) and the Schwarz Information Criterion (SIC). Estimation problems may arise from the presence of stochastic explanatory variables and the possibility of serial correlation that cannot be adequately identified. Thus, we address this possible problem through the use of the Cholesky factorization (Enders, 2004).

Data Requirements

We used the annual time series data for the period covering 1990 to 2010. This study includes the Exports of the Philippines (EXPPH), GDP of the Philippines (GDPPH), currency movement in terms of exchange rate from Philippine Peso to US Dollar (FRXPH), GDP of the USA (GDPUS), and US Imports (IMPUS). These datasets are sourced from the International Financial Statistics (IFS).

Preliminary Tests

Tests for Stationarity and Cointegration

Stationary is one of the features assumed in empirical studies involving time series data to avoid spurious regressions. VAR analysis entails unit root testing of all the variables in the model. Thus, Augmented Dickey-Fuller (ADF) Unit Root Test must be implemented. It is also necessary to establish the number of cointegrating vectors in the system before we proceed to VAR analysis. In this study, we implement Johansen Cointegration Test, which includes the λ-max test and the trace test for hypotheses on individual eigenvalues and for joint hypotheses, respectively.

Vector Autoregression Model Specification

The Vector Autoregressive (VAR) (p) model estimated in this study analyzes the effect of the Global Financial Crisis on the Philippine export sector. The optimal lag structure p of the VAR model is determined by the lowest AIC and SIC (Gujarati, 2003).

$$EXPPH_t = f(GDPPH_t, FRXPH_t, GDPUS_t, IMPUS_t) + \varepsilon_t \quad (3)$$
$$GDPPH_t = f(EXPPH_t, FRXPH_t, GDPUS_t, IMPUS_t) + \varepsilon_t \quad (4)$$
$$FRXPH_t = f(EXPPH_t\ GDPPH_t, , GDPUS_t, IMPUS_t) + \varepsilon_t \quad (5)$$
$$GDPUS_t = f(EXPPH_t\ GDPPH_t, FRXPH_t, IMPUS_t) + \varepsilon_t \quad (6)$$
$$IMPUS_t = f(EXPPH_t, GDPPH_t, FRXPH_t, GDPUS_t) + \varepsilon_t \quad (7)$$

RESULTS AND DISCUSSION

Results of the preliminary tests, VAR estimation procedure, and Impulse Response for Equation 3 are presented in Appendix A, Appendix B, and Appendix C, respectively. Summary of the results are discussed in the succeeding sections.

Cointegration Test

Results of the cointegration test as shown in Appendix A show that at 5 percent level, there are 5 cointegrating equations and at 1 percent level, there is one cointegrating equation. Hence, since there is at least one cointegrating equation, the model shows stationary at level. This entails that the variables are cointegrated and consequently considered to be stationary. Thus, we proceeded to VAR estimation.

VAR Estimation

Results of the VAR estimation procedure are presented in Appendix B, summarized in the succeeding section.

Impact on Philippine GDP

Results indicate that the shock affecting the GDP of the Philippines since the two quarters ago has a positive impact on the current Philippine GDP. This means that the change in Philippine GDP from the past two quarters would influence the current GDP in the same direction, either positively or negatively.

Likewise, results indicate that the shock affecting the export sector of the Philippines a quarter ago has a positive impact on the current Philippine GDP, which implies that the economy's increase in its export sector during that quarter due to a shock would also increase its GDP for the current quarter. However, the shock affecting the export sector of the Philippines two quarters ago has a negative impact on the current quarter's Philippine GDP. This means that the change in export sector of the Philippines two quarters ago due to a shock would have an inverse effect on the country's GDP for the current quarter. Thus, an increase in export two quarters ago due to a shock would mean a decrease in the Philippine GDP for the current quarter.

Furthermore, results indicate that the shock affecting the currency movement, i.e., exchange rate from Philippine Peso (PHP) to US Dollar (USD) two quarters ago has a positive impact on the current Philippine GDP. Thus, depreciation of PHP during that quarter due to a shock would influence a decline in the Philippine GDP for the current quarter. On the other hand, the shock affecting the Philippine currency a quarter ago has a negative impact on the Philippine GDP for the current quarter. This means that an increase in Philippine Peso a quarter ago would mean a decrease in the Philippine GDP for the current quarter.

The results show the effect on GDP of USA the same as with the Philippine currency movement. The shock affecting the GDP of USA two quarters ago has a positive impact on the current Philippine GDP. Thus, a decline in the economy of USA two quarters ago would influence a decline in the Philippine GDP for the current quarter. On the other hand, the shock affecting the economy of the USA a quarter ago has a negative impact on the Philippine GDP for the current quarter. This means that an increase in the economy of the USA a quarter ago would mean a decrease in the Philippine GDP for the current quarter.

Contrary to the effect on GDP of the USA, results indicate that the shock affecting the import of the USA a quarter ago has a positive impact on the current Philippine GDP, which implies that an increase of US imports during that quarter due to a shock would also increase the GDP of the Philippines for the current quarter. However, the shock affecting the GDP of the USA two quarters ago has a negative impact on Philippine GDP for the current quarter. This means that the change in import of the USA two quarters ago due to a shock would have an inverse effect on the Philippine GDP for the current quarter. Thus, an increase in import of the USA two quarters ago due to a shock would mean a decrease in the Philippine GDP for the current quarter.

Impact on Philippine Currency Movement

Results indicate that the shock affecting the GDP of the Philippines a quarter ago has a positive impact on the Philippine currency movement from PHP to USD, which implies that an increase in GDP of the Philippines during that quarter due to a shock would also appreciate PHP for the current quarter. However, the shock affecting the GDP of the country two quarters ago has a negative impact on its currency for the current quarter. This means that the change in GDP of the Philippines two quarters ago due to a shock would have an inverse effect on its currency for the current quarter. Thus, an increase in GDP of the Philippines two quarters ago due to a shock would mean a depreciation of PHP for the current quarter.

Also, results indicate that the shock affecting the export sector of the Philippines two quarters ago has a positive impact on PHP exchange rate to USD for the current quarter. Thus, a decrease in the export sector of the Philippines two quarters ago due to a shock would influence a depreciation of PHP for the current quarter. On the other hand, the shock affecting the Philippine export sector a quarter ago has a negative impact on the PHP exchange rate to USD for the current quarter. This means that an increase in the Philippine export sector a quarter ago would mean a decrease in the Philippine exchange rate to USD for the current quarter.

Furthermore, results indicate that the shock affecting the exchange rate from PHP to USD since the two quarters ago has a positive impact on the foreign exchange for the current quarter. This means that the change in exchange rate from PHP to USD from the past two quarters, whether a decrease or increase, would influence the exchange rate for the current quarter in the same direction.

The results indicate that the shock affecting the GDP of the USA a quarter ago has a positive impact on the PHP exchange rate to USD for the current quarter, which implies that the increase in GDP of the USA during that quarter due to a shock would also increase the Philippine exchange rate to USD for the current quarter. However, the shock affecting the GDP of the USA two quarters ago has a negative impact on the currency of the Philippines. This means that the increase in GDP of the USA two quarters ago due to a shock would mean a depreciation of Philippine Peso for the current quarter.

The results also show that the shock affecting the imports of the USA two quarters ago has a positive impact on the Philippine exchange rate to USD for the current quarter. Thus, reduction in the imports of the USA two quarters ago would influence the depreciation of Philippine Peso for the current quarter. On the other hand, the shock affecting the imports of the USA a quarter ago has a negative impact on the Philippine currency exchange rate to USD for the current quarter. This means that an increase in the imports of the USA a quarter ago would also mean a depreciation of Philippine Peso for the current quarter.

Impact on US GDP

As shown in Appendix B, results indicate that the shock affecting the GDP of the Philippines a quarter ago has a positive impact on the GDP of the USA. This implies that an increase in GDP of the Philippines during that quarter due to a shock would also mean an

increase in the GDP of the USA for the current quarter. However, the shock affecting the GDP of the Philippine economy two quarters ago has a negative impact on the GDP of its major trading partner, the USA. This means that an increase in GDP of the Philippines two quarters ago due to a shock would mean a decline in GDP of the USA for the current quarter.

Also, the results indicate that the shock affecting the export sector of the Philippines since the two quarters ago has a positive impact on the GDP of the USA for the current quarter. This means that the change in the export sector of the Philippines from the past two quarters, whether a decrease or increase, would influence the change in GDP of the USA for the current quarter in the same direction.

In addition, results indicate that the shock affecting the exchange rate from PHP to USD a quarter ago has a positive impact on the GDP of the USA. This implies that an appreciation of Philippine Peso a quarter ago due to a shock would also mean an increase in the GDP of the USA for the current quarter. However, the shock affecting the exchange rate from PHP to USD two quarters ago has a negative impact on the GDP of the USA. This means that Philippine Peso depreciation two quarters ago due to a shock would mean a decline in GDP of the USA for the current quarter.

The results indicate that the shock affecting the GDP of the USA a quarter ago has a positive impact on its economy in terms of GDP in the current quarter. This implies that the increase in GDP of the USA during that quarter due to a shock would extend to the current quarter. However, the shock affecting the GDP of the USA two quarters ago has a negative impact on the GDP of the USA for the current quarter. This means that an increase in GDP of the USA two quarters ago due to a shock would lead to a decline in the GDP of the USA for the current quarter.

Furthermore, the results indicate that the shock affecting the imports of the USA a quarter ago has a positive impact on the GDP of the USA for the current quarter. This implies that the increase in the imports of the USA during that quarter due to a shock would extend to the current quarter. However, the shock affecting the imports of the USA two quarters ago has a negative impact on the GDP of the USA for the current quarter. This means that an increase in the USA imports two quarters ago due to a shock would lead to a decline in the GDP of the USA for the current quarter.

Impact on US Imports

Results indicate that the shock affecting the Philippine GDP two quarters ago has a positive impact on the import sector of the USA for the current quarter. Thus, a decline in GDP of the Philippine economy two quarters ago has an impact of decreasing the imports of the USA for the current quarter. On the other hand, the shock affecting the Philippine GDP a quarter ago has a negative impact on the imports of the USA for the current quarter. This means that an increase in Philippine GDP a quarter ago would mean a decrease in the imports of the USA for the current quarter.

Results of VAR estimates indicate also that the shock affecting the export sector of the Philippines a quarter ago has a positive impact on the current import of the USA. This implies

that an increase in the export sector of the Philippines a quarter ago due to a shock would also increase the import of the USA for the current quarter. However, the shock affecting the export sector of the Philippines two quarters ago has a negative impact on the current quarter's import of the USA. This means that the change in export sector of the Philippines two quarters ago due to a shock would have an inverse effect on the import of the USA for the current quarter. Thus, an increase in export of the Philippines two quarters ago due to a shock would mean a decrease in the imports of the USA for the current quarter.

Furthermore, results indicate that the shock affecting the Philippine exchange rate from PHP to USD two quarters ago has a positive impact on the import sector of the USA for the current quarter. Thus, a depreciation of Philippine Peso two quarters ago has an impact of decreasing the imports of the USA for the current quarter. On the other hand, the shock affecting the Philippine Peso exchange rate to USD a quarter ago has a negative impact on the imports of the USA for the current quarter. This means that an appreciation of PHP a quarter ago would mean a decrease in the imports of the USA for the current quarter.

Results also indicate that the shock affecting the GDP of the USA a quarter ago has a positive impact on the imports of the USA in the current quarter. This implies that the increase in GDP of the USA during that quarter due to a shock would increase the import of the economy for the current quarter. However, the shock affecting the GDP of the USA two quarters ago has a negative impact on its imports for the current quarter. This means that an increase in GDP of the USA two quarters ago due to a shock would lead to a decline in the its import for the current quarter.

Moreover, the results indicate that the shock affecting the imports of the USA a quarter ago has a positive impact on the import of the USA for the current quarter. This implies that the increase in the imports of the USA during a quarter extends to the current quarter. However, the shock affecting the imports of the USA two quarters ago has a negative impact on the imports of the USA for the current quarter. This means that an increase in the USA imports two quarters ago due to a shock would lead to a decline in the imports of the USA for the current quarter.

Impact on Philippine Exports

Results as shown in Appendix B indicate that the shock affecting the Philippine GDP two quarters ago has a positive impact on the export sector of the Philippines for the current quarter. Thus, a decline in GDP of the Philippine economy two quarters ago has an impact of decreasing the exports of the Philippines for the current quarter. On the other hand, the shock affecting the Philippine GDP a quarter ago has a negative impact on the Philippine export sector for the current quarter. This means that an increase in Philippine GDP a quarter ago would mean a decrease in the exports of the Philippines for the current quarter.

Also, the results indicate that the shock affecting the export sector of the Philippines since the two quarters ago has a positive impact on the current Philippine export sector. This means that the change in Philippine export sector from the past two quarters would influence

the change in the current export sector of the Philippines in the same direction, either positively or negatively.

Furthermore, results indicate that the shock affecting the exchange rate from PHP to USD two quarters ago has a positive impact on the current Philippine export sector. Thus, depreciation of PHP two quarters ago due to a shock would influence a decline in the export sector of the Philippines for the current quarter. On the other hand, the shock affecting the Philippine currency a quarter ago has a negative impact on the Philippine export sector for the current quarter. This means that an appreciation of Philippine Peso a quarter ago would mean a decrease in the Philippine export sector for the current quarter.

The results show that the shock affecting the GDP of USA two quarters ago has a positive impact on the current Philippine export sector. Thus, a decline in the economy of USA two quarters ago would influence a decline in the Philippine export sector for the current quarter. On the other hand, the shock affecting the economy of the USA in terms of GDP a quarter ago has a negative impact on the Philippine export sector for the current quarter. This means that an increase in the economy of the USA a quarter ago would mean a decrease in the Philippine export for the current quarter.

Contrary to the effect on GDP of the USA, results indicate that the shock affecting the import of the USA a quarter ago has a positive impact on the current Philippine export sector, which implies that an increase of US imports a quarter ago due to a shock would also increase the export sector of the Philippines for the current quarter. However, the shock affecting the import of the USA two quarters ago has a negative impact on Philippine GDP for the current quarter. This means that the change in import of the USA two quarters ago due to a shock would have an inverse effect on the Philippine export sector for the current quarter. Thus, an increase in import of the USA two quarters ago due to a shock would mean a decrease in the Philippine export sector for the current quarter.

Impulse Response

Results of the Impulse Response for Equation 3 are presented in Appendix C, summarized as follows:

Impulse Response of Philippine Export Sector to Philippine GDP

Results show that the shocks in the Philippine export sector (EXPPH) are significantly but negatively generated by the impact of the shocks on GDPPH at initial periods. This finding underpins the result from the VAR estimation, which implies that changes take effect at the contemporaneous period. Subsequently, non-significance effect for a long period will be pursued by a negative significant effect in the long run. This finding indicates that the trend in Philippine state of economic health displays the delayed effect of changes in EXPPH aside from the contemporaneous effect.

Impulse Response of Philippine Export Sector to Philippine Exports

As shown in Appendix C, the results indicate that the shocks in EXPPH are positively and significantly generated by the impact of the shocks on EXPPH itself. This reinforces the result from the VAR estimation. Meanwhile, the significant response has its downward trend that might necessitate EXPPH to surge again.

Impulse Response of Philippine Export Sector to Philippine Currency Movement

Results shown in Appendix C indicate that the shocks in EXPPH are not significantly generated by the impact on Philippine exchange rate from PHP to USD (FRXPH). It has to be noted also that the results from the VAR estimates indicate a fluctuating trend as to the response of EXPPH to the impact of the shocks to FRXPH. Thus, it indicates that the variation in Philippine export sector is not significantly influenced by the Philippine exchange rate mechanism. Since export demand diminishes due to the GFC, exchange rates will not matter to export competitiveness but only when export demand recovers and countries compete to raise their market share (Ariff, 2010).

Impulse Response of Philippine Export Sector to the GDP of the USA

As can be seen in Appendix C, the shocks in the EXPPH are not significantly generated by the impact of the shocks on GDPUS. While the VAR estimates indicate that the shock has a positive impact on GDPUS at current period, this implies that changes take effect only at the contemporaneous period while it is not significant. This might be attributable to the argument of Yap (2008a) as cited in Yap, J., Reyes, C. & Cuenca, (2009) that primarily because of the historical low correlations between US and Philippine GDP growth rates, US recession will have minimal impact on the Philippine economy and hence, associated with the insignificant effect on the Philippine export sector.

Impulse Response of Philippine Export Sector to the Imports of the USA

Results shown in Appendix C indicate that the shocks in EXPPH are positively and significantly generated by the impact of the shocks on IMPUS at the initial period. Such findings reinforce the results of the VAR estimates. The variations that take effect at the contemporaneous period are succeeded by non-significance effect. Thereafter, shocks show significance at later periods but at a negative response, exhibiting effects distributed at various lags that also support the VAR estimates. These findings underpin that since the Philippines is not the major importer of the USA, then the variation in the Philippine exports are not attributable to the impact of the shock on the imports of the USA. Among the top major trading partners of the USA are Canada, China, Mexico, Japan, Germany, United Kingdom, and Korea while the Philippines only ranked 35th in the list(Source: US International Trade Commission).

CONCLUSIONS AND POLICY IMPLICATIONS

The 2008 Global Financial Crisis has taken economic and global scale effects. The crisis has affected the Philippine economy in terms of declining exports, remittances of Filipino workers and foreign direct investments.

This study examined the effects of GFC on the Philippines' export sector (EXPPH). By the use of vector autoregression (VAR) analysis, this study assessed the impact on EXPPH with respect to the changes on the Philippine Gross Domestic Product, Philippine currency movement in terms of exchange rate from Philippine Peso (PHP) to US Dollar (USD), and the changes in US GDP and US imports, being US as the major trading partner of the Philippines.

Based on the results from the analyses of VAR estimates and impulse-response functions, the shocks in the Philippine export sector (EXPPH) are significantly but negatively generated by the impact of the shocks on Philippine GDP at initial periods. The changes take effect at the contemporaneous period with subsequent non-significance effect for a long period though eventually pursued by a negative significant delayed effect in the long run. This finding indicates that the trend in Philippine state of economic health displays effects in Philippine exports distributed at various lags.

Results also show that variations in Philippine export sectors are positively and significantly generated by the previous impact of the shocks on Philippine export itself. Although the Philippines has become increasingly integrated with the rest of the world, its economy is vulnerable to internal disturbances that have an impact on its export sector felt across periods. Meanwhile, the significant response exhibits a downward trend that suggests attempts for the Philippine export sector to surge again.

Furthermore, results indicate that the shocks affecting the Philippine export sector are not significantly generated by the impact on Philippine exchange rate from PHP to US Dollar. The exchange rates will not have an impact on the Philippine exports during the season with diminishing trend of export demand, but only when export sector recovers and countries start competing again for their increase market share.

Also, results show that variation in Philippine export sector is not significantly generated by the impact of the shocks on the USA economic health in terms of GDP. Thus, this finding suggests that changes in the economic performance of the USA might not be attributable to the variation in Philippine export activities due to the historical low correlations between US and Philippine GDP growth rates, and that US recession has minimal impact on the Philippine economy.

Moreover, results indicate that the corresponding effect of the shocks on the Philippine export sector is positively and significantly generated by the impact of the shocks on the imports of the USA at the initial periods. The variations that take effect at the contemporaneous period are succeeded by non-significance effect before having a negative significant effect, exhibiting effects distributed at various lags. Putting it differently, the adverse effect of shocks on the imports of the USA will not influence the decline of Philippine exports in the long run due to the plausible reason that the Philippines is not the major importer of the USA.

Measures have been adapted by the Philippines for macroeconomic stability such as increasing access to world markets, including trade liberalization, supported by prudential regulations and policies coming from various sectors. However, these policies did not generate the desired results and the Philippines continued to lag behind its neighboring countries. Hence, this study suggests to explore whether this crisis can be a thrust for more reforms; and to thoroughly examine the policies before their implementation to better cope with a crisis and avoid the effects of the past mistakes from happening again.

Furthermore, this study suggests addressing the need of the Philippines to establish and expand its trading relationships with other countries aside from its current major partners such as the USA and Japan, thereby protecting its export sector from the economic shocks coming from these countries. Through diversification and further economic integration, we anticipate the export sector of the Philippines to be stable and eliminate the adverse effects of external markets.

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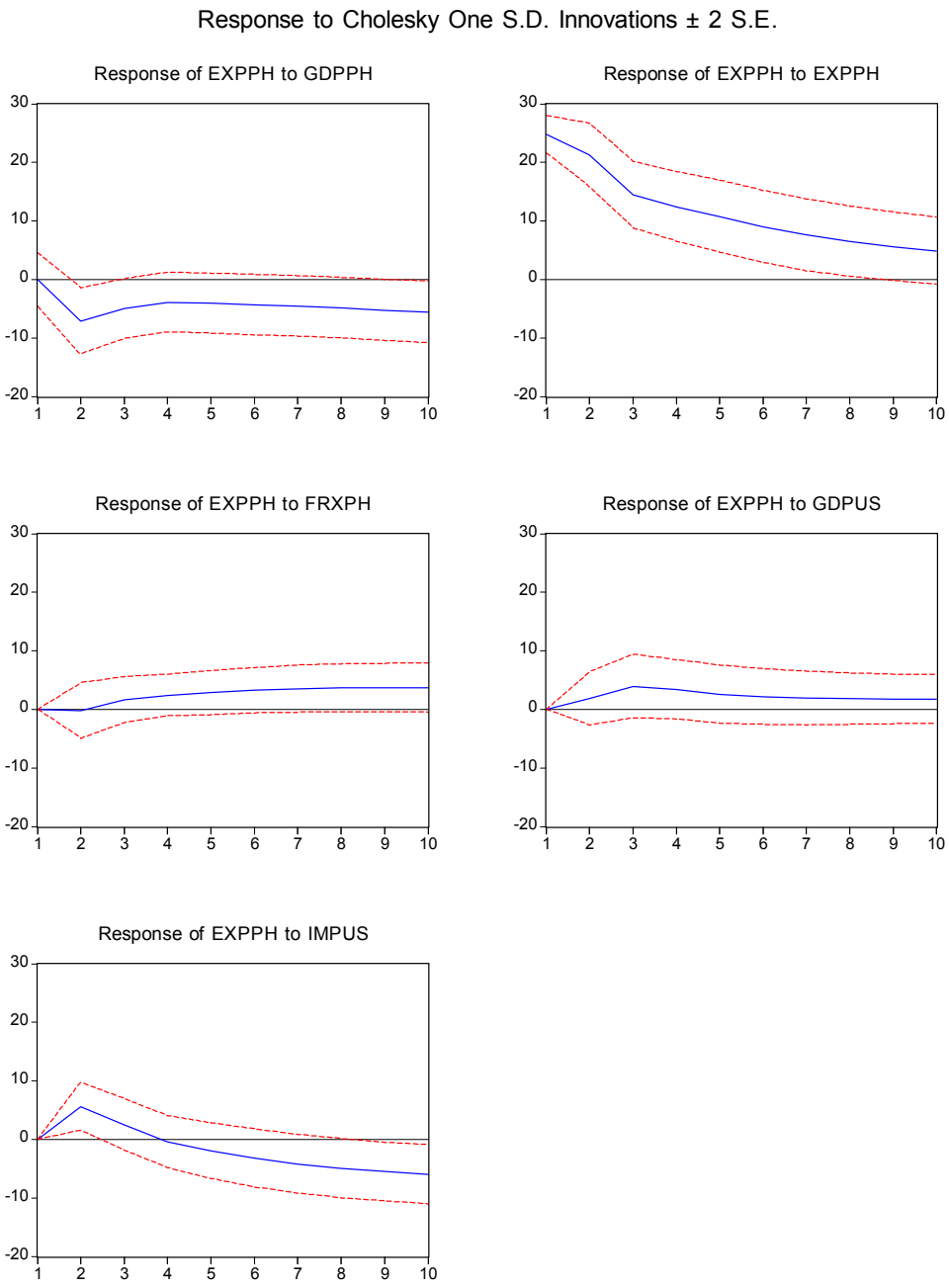
Appendix A: Johansen Cointegration Test					
Unrestricted Cointegration Rank Test					
Hypothesized		Trace	5 Percent	1 Percent	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value	
None **	0.263914	89.57485	68.52	76.07	
At most 1 *	0.158388	54.03156	47.21	54.46	
At most 2 *	0.126806	34.02895	29.68	35.65	
At most 3 *	0.105425	18.29968	15.41	20.04	
At most 4 *	0.045292	5.376517	3.76	6.65	
*(**) denotes rejection of the hypothesis at the 5%(1%) level					
Trace test indicates 5 cointegrating equation(s) at the 5% level					
Trace test indicates 1 cointegrating equation(s) at the 1% level					
Hypothesized		Max-Eigen	5 Percent	1 Percent	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Critical Value	
None *	0.263914	35.54329	33.46	38.77	
At most 1	0.158388	20.00261	27.07	32.24	
At most 2	0.126806	15.72927	20.97	25.52	
At most 3	0.105425	12.92316	14.07	18.63	
At most 4 *	0.045292	5.376517	3.76	6.65	
*(**) denotes rejection of the hypothesis at the 5%(1%) level					
Max-eigenvalue test indicates 1 cointegrating equation(s) at the 5% level					
Max-eigenvalue test indicates no cointegration at the 1% level					
Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):					
GDPPH	EXPPH	FRXPH	GDPUS	IMPUS	
-0.025593	0.004772	-0.004553	-0.000265	9.95E-05	
0.005889	-0.009869	-0.006787	0.001214	-3.24E-05	
-0.001981	0.017275	-0.007455	-0.000120	-2.93E-05	
-0.010844	0.002439	0.016616	0.003053	-2.16E-05	
-0.003951	-0.025644	0.006718	0.001543	2.27E-05	
Unrestricted Adjustment Coefficients (alpha):					
D(GDPPH)	2.918715	1.505091	-4.911912	4.836795	-2.694392
D(EXPPH)	-3.117172	3.693301	1.188809	3.836063	2.468443
D(FRXPH)	3.385343	6.257163	0.843816	-2.838404	-0.864894
D(GDPUS)	-6.474192	-0.517614	12.25720	3.189147	-6.198912
D(IMPUS)	-2849.812	1141.057	-185.4042	153.5690	-580.7490
1 Cointegrating Equation(s):		Log likelihood	-3326.165		
Normalized cointegrating coefficients (std.err. in parentheses)					
GDPPH	EXPPH	FRXPH	GDPUS	IMPUS	
1.000000	-0.186473	0.177898	0.010361	-0.003887	
	(0.21898)	(0.13915)	(0.02380)	(0.00048)	
Adjustment coefficients (std.err. in parentheses)					
D(GDPPH)	-0.074700				
	(0.06523)				
D(EXPPH)	0.079779				
	(0.05269)				
D(FRXPH)	-0.086643				
	(0.05130)				
D(GDPUS)	0.165697				
	(0.12517)				
D(IMPUS)	72.93653				
	(16.4458)				
2 Cointegrating Equation(s):		Log likelihood	-3316.164		
Normalized cointegrating coefficients (std.err. in parentheses)					
GDPPH	EXPPH	FRXPH	GDPUS	IMPUS	
1.000000	0.000000	0.344466	-0.014151	-0.003685	
		(0.17641)	(0.02876)	(0.00061)	
0.000000	1.000000	0.893255	-0.131448	0.001081	
		(0.53246)	(0.08681)	(0.00183)	
Adjustment coefficients (std.err. in parentheses)					
D(GDPPH)	-0.065837	-0.000924			
	(0.06681)	(0.02789)			
D(EXPPH)	0.101527	-0.051326			

Appendix A: Johansen Cointegration Test					
	(0.05314)	(0.02218)			
D(FRXPH)	-0.049797	-0.045596			
	(0.04984)	(0.02080)			
D(GDPUS)	0.162649	-0.025790			
	(0.12843)	(0.05361)			
D(IMPUS)	79.65571	-24.86180			
	(16.5901)	(6.92507)			
3 Cointegrating Equation(s):		Log likelihood	-3308.299		
Normalized cointegrating coefficients (std.err. in parentheses)					
GDPPH	EXPPH	FRXPH	GDPUS	IMPUS	
1.000000	0.000000	0.000000	0.018779	-0.004542	
			(0.01933)	(0.00044)	
0.000000	1.000000	0.000000	-0.046057	-0.001141	
			(0.03362)	(0.00077)	
0.000000	0.000000	1.000000	-0.095595	0.002488	
			(0.05771)	(0.00131)	
Adjustment coefficients (std.err. in parentheses)					
D(GDPPH)	-0.056109	-0.085777	0.013112		
	(0.06565)	(0.05100)	(0.02758)		
D(EXPPH)	0.099173	-0.030790	-0.019737		
	(0.05319)	(0.04132)	(0.02234)		
D(FRXPH)	-0.051468	-0.031019	-0.064172		
	(0.04993)	(0.03879)	(0.02097)		
D(GDPUS)	0.138372	0.185951	-0.058382		
	(0.12442)	(0.09665)	(0.05226)		
D(IMPUS)	80.02292	-28.06462	6.612863		
	(16.6295)	(12.9186)	(6.98473)		
4 Cointegrating Equation(s):		Log likelihood	-3301.837		
Normalized cointegrating coefficients (std.err. in parentheses)					
GDPPH	EXPPH	FRXPH	GDPUS	IMPUS	
1.000000	0.000000	0.000000	0.000000	-0.004128	
				(7.4E-05)	
0.000000	1.000000	0.000000	0.000000	-0.002157	
				(0.00014)	
0.000000	0.000000	1.000000	0.000000	0.000377	
				(0.00017)	
0.000000	0.000000	0.000000	1.000000	-0.022074	
				(0.00107)	
Adjustment coefficients (std.err. in parentheses)					
D(GDPPH)	-0.108558	-0.073980	0.093479	0.016409	
	(0.06956)	(0.05032)	(0.04875)	(0.00806)	
D(EXPPH)	0.057575	-0.021434	0.044002	0.016877	
	(0.05641)	(0.04081)	(0.03953)	(0.00653)	
D(FRXPH)	-0.020689	-0.037942	-0.111334	-0.002068	
	(0.05335)	(0.03859)	(0.03739)	(0.00618)	
D(GDPUS)	0.103790	0.193729	-0.005392	0.009351	
	(0.13422)	(0.09710)	(0.09407)	(0.01554)	
D(IMPUS)	78.35765	-27.69008	9.164522	2.631948	
	(17.9783)	(13.0060)	(12.5999)	(2.08181)	

Appendix B: Vector Autoregression Esimates					
	GDPPH	EXPPH	FRXPH	GDPUS	IMPUS
GDPPH(-1)	0.060891	-0.155498	0.014715	0.069707	-72.85968
	(0.08984)	(0.04028)	(0.03166)	(0.08482)	(13.4097)
	[0.67779]	[-3.86003]	[0.46482]	[0.82182]	[-5.43336]
GDPPH(-2)	0.617318	0.096210	-0.004238	-0.180016	81.92252
	(0.08235)	(0.03693)	(0.02902)	(0.07776)	(12.2928)
	[7.49585]	[2.60526]	[-0.14603]	[-2.31512]	[6.66425]
EXPPH(-1)	0.823085	0.748363	-0.065364	0.244377	21.42023
	(0.22839)	(0.10241)	(0.08048)	(0.21564)	(34.0907)
	[3.60390]	[7.30736]	[-0.81219]	[1.13329]	[0.62833]
EXPPH(-2)	-0.851364	0.095362	0.030590	0.232935	-20.93768
	(0.23805)	(0.10674)	(0.08388)	(0.22475)	(35.5324)
	[-3.57647]	[0.89338]	[0.36468]	[1.03640]	[-0.58926]
FRXPH(-1)	-0.201655	-0.060739	0.722847	0.038405	-38.62646
	(0.26985)	(0.12101)	(0.09509)	(0.25479)	(40.2804)
	[-0.74727]	[-0.50194]	[7.60162]	[0.15073]	[-0.95894]
FRXPH(-2)	0.276022	0.155117	0.201634	-0.089323	51.96618
	(0.26574)	(0.11916)	(0.09364)	(0.25090)	(39.6665)
	[1.03869]	[1.30173]	[2.15325]	[-0.35601]	[1.31008]
GDPUS(-1)	-0.096791	-0.028264	0.018222	1.210713	39.32153
	(0.10627)	(0.04766)	(0.03745)	(0.10034)	(15.8633)
	[-0.91076]	[-0.59310]	[0.48657]	[12.0660]	[2.47877]
GDPUS(-2)	0.105450	0.055103	-0.018391	-0.200166	-33.73439
	(0.10694)	(0.04795)	(0.03768)	(0.10097)	(15.9623)
	[0.98609]	[1.14911]	[-0.48806]	[-1.98248]	[-2.11338]
IMPUS(-1)	0.001815	0.000873	-9.65E-05	0.000315	1.094750
	(0.00070)	(0.00031)	(0.00025)	(0.00066)	(0.10457)
	[2.59085]	[2.77786]	[-0.39074]	[0.47588]	[10.4694]
IMPUS(-2)	-0.000594	-0.000936	0.000110	-0.000982	-0.242833
	(0.00072)	(0.00032)	(0.00025)	(0.00068)	(0.10726)
	[-0.82697]	[-2.90398]	[0.43506]	[-1.44757]	[-2.26398]
C	-115.5263	-123.4189	8.598861	86.34418	-18363.00
	(80.7339)	(36.2023)	(28.4489)	(76.2261)	(12050.9)
	[-1.43095]	[-3.40915]	[0.30226]	[1.13274]	[-1.52379]
R-squared	0.992121	0.992029	0.973599	0.999801	0.997330
Adj. R-squared	0.991392	0.991291	0.971154	0.999783	0.997083
Sum sq. resids	328999.8	66154.01	40852.30	293286.6	7.33E+09
S.E. equation	55.19325	24.74949	19.44896	52.11158	8238.532
F-statistic	1359.992	1344.084	398.2716	54245.09	4034.513
Log likelihood	-640.3727	-544.9304	-516.2501	-633.5357	-1236.055
Akaike AIC	10.94744	9.343368	8.861346	10.83253	20.95891
Schwarz SC	11.20433	9.600262	9.118240	11.08943	21.21581
Mean dependent	715.4495	303.4365	174.1942	8232.878	242718.9
S.D. dependent	594.8820	265.2017	114.5131	3533.594	152540.4
Determinant Residual Covariance		7.72E+19			
Log Likelihood (d.f. adjusted)		-3568.983			
Akaike Information Criteria		60.90727			
Schwarz Criteria		62.19174			

Appendix C: Impulse Response



CULTURE AND THE GLOBALIZATION OF THE INTERNATIONAL FINANCIAL REPORTING STANDARDS (IFRS) IN DEVELOPING COUNTRIES

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ABSTRACT

How do countries` societal values influence their attitude toward the globalization of IFRS? Inspired by Gernon & Wallace's (1995) Accounting Ecology framework and drawing on DiMaggio & Powell's (1983) Institutional Isomorphism perspective, we reveal that national culture compared to economic pressures, have stronger impacts on developing countries` decision to adopt or not to adopt IFRS. Specifically, we use Hofstede`s cultural dimension of power distance, uncertainty avoidance, individuality, and masculinity as predictors to IFRS adoption in 40 developing countries during 2005-2009. Using various regression estimations in an integrative model that includes social and economic variables, we find that countries that have high centralization of power, high conservatism, and high self orientation are not interested in adopting IFRS. We also confirm that national accounting ecology of developing countries is not in equilibrium.

INTRODUCTION

Culture has been known as one of environmental factors that significantly influence national accounting system and development (Radebaugh & Gray, 2002; Roberts, Weetman, & Gordon, 2002), but is still less noticed by accounting scholars compared to economic, sociohistorical, and institutional factors (Choi & Meek, 2011). Gernon & Wallace (1995) proposed a perspective, called "national accounting ecology", and maintained that it "provide an integrated, holistic, rather than unidimensional, geopolitical view of the national accounting scene that takes account of both cultural and non-cultural features." (Gernon & Wallace, 1995, p. 59). The national accounting ecology consists of five separate but interacting slices of societal, organizational, professional, individual and accounting. They also pointed out that "countries possessing accounting systems that are most highly disequilibriated would move toward a more equilibriated position." (Gernon & Wallace, 1995, p. 64) and thus asked other researchers to test the movement of countries that are out of equilibrium to a more equilibrating position.

Countries that have less developed accounting infrastructures will try to improve their accounting slice or weaken other environmental factors, including cultural slice. Compared to developed countries, developing countries possess weaker accounting systems and younger accounting development. Consequently, developing countries are more susceptible to disequilibrium. For example, the societal factor compared to economic factor is stronger in influencing developing countries decision to adopt or not to adopt International Financial Reporting Standards (IFRS) (Lasmin, 2011).

In addition, Radebaugh Gray (2002) stated "National cultures, traditions … will be increasingly challenged in the years ahead as the pressures for global convergence increasingly impact accountants and accounting practices." (Radebaugh & Gray, 2002, p. 54). Therefore, our aims is to examine whether developing countries accounting environmental factors, especially culture, has significantly influenced their accounting system and development, and together with institutional and economic factors, are in equilibrium.

The reminder of this paper proceds as follows. First, we present the existing research about culture and accounting, followed by some leading theories of national culture and the framework of national culture that is used in this paper. Then, we present our methodology and regression results. The final section discuss the implications and conclusions.

FRAMEWORK AND METHODOLOGY

Models of National Culture

Nardon & Steers (2009) explained that there are six leading models of national culture. The six models include those that were proposed by Kluckhohn & Strodtbeck, Hofstede, Hall, Trompenaars, Schwartz, and House. First, Kluckhohn & Strodtbeck, taking an anthropology perspective, identified five value orientations with a three-point continuum. These orientations are Relationship with nature, Relationship with people, Human activities, Relationship with time, Human nature (as cited in Nardon & Steers, 2009). Second, Hofstede (2010) presented six cultural dimensions: Power distance differences, Individualism and Collectivism, Masculinity and Femininity, Uncertainty-avoidance differences, Long- and Short-term orientation, and Indulgence versus Restraint (Hofstede, Hofstede, & Minkov, 2010).

Third, Hall (1981, 1990), an anthropologist, using his ethnographic studies in various countries, proposed three cultural dimensions on a dichotomous scaling: Context, Space, and Time (as cited in Nardon & Steers, 2009). Fourth, Trompenaars (1993) and Trompenaars and Hampden-Turner (1998) based their work on that of Parsons and Shils (1951) and Hofstede presented seven cultural dimensions: Universalism-Particularism, Individualism-Collectivism, Specific-Diffuse, Neutral-Affective, Achievement-Ascription, Time Perspective, Relationship with environment (as cited in Nardon & Steers, 2009).

Fifth, Schwartz (1994) maintained that the level of analysis of cultural dimensions is independent from that of individual dimensions. ." These cultural dimensions are Conservatism-Autonomy, Hierarchy-Egalitarianism, and Mastery-Harmony. He argued that whereas at individual level, these dimensions are related to the "psychological dynamics that individual experience when acting on their values in the everyday life", cultural dimensions "reflect the solutions that societies find to regulate human actions (as cited in Nardon & Steers, 2009, p. 7). Lastly, House, Hanges, Javidan, Dorfman, and Gupta (2004) initiated the project "GLOBE" or Global leadership and Organizational Behavior Effectiveness to study the influence of culture to leadership. Based on data collected in 62 countries, they derived nine cultural dimensions. They are Power distance, Uncertainty avoidance, Humane orientation, Institutional Collectivism, In-

Group Collectivism, Assertiveness, Gender Egalitarianism, Future orientation, Performance Orientation (as cited in Nardon & Steers, 2009).

Nardon and Steers (2009) tried to converge these six leading models of national cultures into a new cultural framework. This new framework, consists of five core cultural dimensions, was created by synthesizing the five important common themes across the models. by The five cultural dimensions are "Hierarchy-Equality", "Individualism-Collectivism", "Mastery-Harmony", "Monochronism-Polychronism", and Universalism-Particularism". The five important themes are distribution of power and authority, emphasis on groups or individuals, relationship with environment, use of time, and personal and social control. (Nardon & Steers, 2009).

Nevertheless, this new converged cultural model still retain and to certain extent follow Hofstede's (2001) framework although Nardon and Steers (2009) maintained that the other five models also contribute "something". As they stated "… this five themes seem to replicate Hofstede's five dimensions, … , each model thus adds something of value to this endeavor." (Nardon & Steers, 2009, p. 9)

Nakata (2009) admitted the strong presence of Hofstede's work and pointed out that Hofstede's framework is the dominant culture model because of three important reasons: (1) the framework covers huge scope of countries and regions; (2) the framework can be used to explain national culture and national sub-culture; (3) the framework is sufficiently based on previously existing theories in anthropology, sociology, and psychology; and (4) the framework comes with readily used scores and indices (Nakata, 2009).

The significant influence of Hofstede's model are also captured by Leung and Ang (2009) who described "The focus on national culture as a major variable in global management research has been primarily guided and inspired by the now classic work of Hofstede (1980), … Hofstede's work is obviously important and influential, … Hofstede's (1980) monumental work, … (Leung & Ang, 2009, p. 23). Finally, Nardon and Steers (2009) concluded that "Dutch management researcher Geert Hofstede (1980, 2001) advanced the most widely used model of cultural differences in the organizations literature." (Nardon & Steers, 2009, p. 4)

However, Hofstede is not free of criticism. Nakata (2009) maintained that "When Hofstede wrote his book in 1980, the world was a simpler place. … were fairly bound, stable, and intact. ... nations have become more permeable and heterogeneous, and are altering through dismantlement … as well as integration… " (Nakata, 2009, p. 5). A more critical analysis of the use of Hofstede's cultural dimensions was conducted by Baskerville (2003). She listed three main problems of using Hofstede's work: (1) the assumption of equating nation with culture, (2) the difficulties of, and limitations on, a quantification of culture represented by cultural dimensions and matrices, (3) the status of the observer outside the culture (Baskerville, 2003, 1).

Hofstede (2003) replied that Baskerville's arguments are mostly irrelevant due to her overlooking on important aspects of cultural studies, such as unconvincing replications on Hofstede\s works cited in Baskerville, a previous work by Inkeles and Levinson (1991) that was claimed by Baskerville as uncited (but cited by Hofstede in the different edition), and "different paradigms in the social sciences about the meaning of culture" (Hofstede, 2003, p. 811). Nevertheless, it seems that they agree on one issue, Hofstede's national cultural dimensions are

correlated to some national socio-economic indicators, and this statistically could lead to the endogeneity problem.

Culture as one of the Antecedents of the IFRS Adoption

In 2011, more than 120 countries have permitted the use of the International Financial Reporting Standards (IFRS) (IASPlus, 2010). This phenomenon is partly triggered by economic pressures, such as pressures to have higher quality of financial reporting, to attract more investment, to increase financial surplus, and achieves higher economic growth rates (Rodrigues & Craig, 2007; Roberts, Weetman, Gordon, 2002; Hope, Jin, & Kang, 2006); and partly by societal and institutional factors, such as literacy rate (Placeholder1); culture (Zeghal & Mhedhbi, 2006; Ding, Jeanjean, & Stolwy, 2005; (Clements, Neill, & Stovall, 2010); and language (Doupnik & Taylor, 1985).

With regards to culture as an independent variable to the IFRS adoption, Zeghal & Mhedhbi (2006) used a dichotomous Anglo-American and Non Anglo-American culture, and found that countries having cultural tie with Anglo-American are likely to adopt IFRS (Zeghal & Mhedhbi, 2006). Ding, Jeanjean, & Stolwy (2005) employed Hofstede's cultural dimensions and Schwarts's value types, and found that Individualism versus Collectivism (IDV), Uncertainty Avoidance (UAI), and Schwartz's cultural dimensions are significantly related to the divergence of international accounting standards. No significant association can be found amongst Power Distance (PDI), Masculunity versus Femininity (MAS), and the differences between national accounting standards and international accounting standars. On the contrary, Clements, Neill, & Stovall (2010) could not find any significant relationship between Hofstede's cultural dimension and countries decision to adopt IFRS. These existing studies however do not explicitly based their research models on theories or explicitly stated theories as Gernon & Wallace (1995) put it.

Following DiMaggio & Powell's Institutional Isomorphism theory, Lasmin (2011) empirically tested the three forms of isomorphism (coercive, mimetic, and normative isomorphism) and found that their influences are stronger, compared to economic pressures such as foreign direct investment (FDI) inflows and Gross Domestic Product (GDP) growth, to the developing countries decision to adopt and not to adopt IFRS. In this paper, drawing on Gernon & Wallace 's (1995) accounting ecology perspective we extend our previous study by adding culture into the existing societal factor (institutional isomorphism) and economic factor (FDI and GDP growth).

Linking National Culture with Accounting

We used four of Hofstede's (2010) cultural dimensions to represent our definition of culture for several reasons that will be elaborated below. Hofstede (2001) initially introduced five dimensions: Power distance differences, Individualism and Collectivism, Masculinity and Femininity, Uncertainty-avoidance differences, Long- and Short-term orientation, and a new dimension, Indulgence versus Restraint, was added in 2010 (Hofstede, Hofstede, & Minkov, 2010). We decided not to use Long- and Short-term orientation due to its high correlation with

one of our independent variable, GDP growth; and not to use Indulgence versus Restraint because of its newness and its significant correlation with Long- and Short-term orientation. We also decided not to use Gray's (1988) work because we are interested to examine the relationships between culture and accounting systems in developing countries only; and we are motivated to examine cultural dimensions directly from Hofstede's (1980, 2001) and Hofstede, Hofstede, & Minkov's (2010) model.

Hofstede, et. al. (2010) defines culture as "collective programming of the mind which distinguishes the members of one human group from another" (Hofstede, Hofstede, & Minkov, 2010, p. 6). He further maintains that it is possible to draw lines among national cultures because national cultures have distinct aspects. These aspects of "a culture that can be measured relative to other cultures" (Hofstede, Hofstede, & Minkov, 2010, p. 31) are what he called cultural dimensions. Hofstede explained that his empirical findings on the "original" four cultural dimensions, Power distance differences, Individualism and Collectivism, Masculinity and Femininity, Uncertainty-avoidance differences were based on the work of Inkeles and Levinson (1954). Inkeles and Levinson conducted survey of the English-language literature on national culture and identified common basic problems worldwide. These problems are: (1) relation to authority, (2) relationship between individual and society, (3) individual`s concept of masculinity and femininity, and (4) ways in dealing with conflicts (as cited in Hofstede, Hofstede, Minkov, 2010, p. 29-31).

These four cultural dimensions, compared to the other two newly added dimensions have been examined and retested by various scholars, making the high reliability and validity of the four dimensions even higher. In the next section, we will briefly describe the four dimensions and provide selected important attributes of these dimensions. This is followed by the establishment of the relationships between these cultural dimensions and developing countries decision to adopt or not to adopt IFRS.

Power Distance (PDI), scaled from small to large, is related to "social inequality including the relationship with authority" (Hofstede, Hofstede, & Minkov, 2010, p. 30) and is defined as "the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally." (Hofstede, Hofstede, & Minkov, 2010, p. 61) Hence, PDI is derived from the value system of the less powerful members, not from that of the more powerful members.

Individualism versus Collectivism (IDV), scaled from weak to strong, refers to "the relationship between the individual and the group". (Hofstede, Hofstede, & Minkov, 2010, p. 30) Individualism is associated with "societies in which the ties between individuals are loose: everyone is expected to look after him- or herself and his or her immediate family. On the contrary, Collectivism refers to "societies in which people from birth onward are integrated into strong, cohesive in-groups, which throughout people's lifetime continue to protect them in exchange for unquestioning loyalty." (Hofstede, Hofstede, & Minkov, 2010, p. 92)

Masculinity versus Femininity (MAS), scaled from weak to strong, deals with the concepts of the social and emotional implications of having been born as a boy or a girl". (Hofstede, Hofstede, & Minkov, 2010, p. 30) Masculinity exists in a society "when emotional gender roles are clearly distinct: men are supposed to be assertive, tough, and focused on

material success, whereas women are supposed to be more modest, tender, and concerned with the quality of life." Alternatively, femininity exists "when emotional gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life." (Hofstede, Hofstede, & Minkov, 2010, p. 140)

Uncertainty avoidance (UAI), scaled from weak to strong, is related to "ways of dealing with uncertainty and ambiguity, which turned out to be related to the control of aggression and the expression of emotions." (Hofstede, Hofstede, & Minkov, 2010, p. 30) Thus, can be defined as "the extent to which the members of a culture feel threatened by ambiguous or unknown situations." (Hofstede, Hofstede, & Minkov, 2010, p. 191)

Table 1 shows some the most suitable attributes of the four Hofstede's cultural dimensions that can be linked directly and indirectly to developing countries decision to adopt or not to adopt IFRS. Using attributes that are listed in this table, we propose relationships between these dimensions and countries decision of IFRS adoption. For example, adopting IFRS is seen as a way to have national financial reporting standards equal to international accounting standards; hence, countries with small PDI (1. Inequalities among people [countries] should be minimized) tend to adopt IFRS. For developing countries, adopting IFRS also can be seen as away to move to a group of countries that already adopted IFRS; thus, countries with strong IDV (1. Everyone grows up to look after him- or herself and his or her immediate [nuclear family] only.) tend not to adopt IFRS. This is because developing countries need to be accepted as members of IFRS adopters, not as countries that have their national accounting standards (him- or herself) or a group of countries that have regional accounting standards (nuclear family only).

Special attention should be addressed to attributes no. 2 of Collectivism and Individualism which is Exclusionism versus Universalism. Misho (2007) explained that Exclusionim is "the cultural tendency to treat people on basis of their group affiliation" … Universalism is the opposite cultural tendency: treating people primarily on the basis of who they are as individuals and disregarding their group affiliations." (as cited in Hofstede, Hofstede, & Minkov, 2010, p. 98). Adoption of IFRS therefore, should be seen as a reaction due to the dominant position of exclusionism in a country. Developing countries are more likely want to be exclusively grouped as "IFRS adopters" and enjoy benefits or privilages from this grouping. If countries are treated equally regardless of their IFRS adoption status, the pressures to adopt IFRS would not exist.

Countries with weaker UAI tend to adopt IFRS because the net benefits of adopting IFRS are never certain (1. Uncertainty is a normal feature of life; 2. Comfortable in ambiguous situation with unfamiliar risks); and IFRS constitute principle-based standards (3. Few and general laws or unwritten rules and 4. There should be no more rules than strictly needed). Countries with Strong MAS expect the complete adoption of a stronger set of accounting standards (1. Immigrants [non international accounting standards] should assimilate [fully adopt]) to achieve higher economic growth (4. The economy should continue growing: big is beautiful). Similar ways of reasoning are performed for the rest of the selected attributes of these four cultural dimensions. Table 2 summarize these relationships and is used as the direction of correlation and regression in our analysis.

Hypotheses

Based on Table 2 and previously elaborated relationships between national cultural dimensions and developing countries decision to adopt or not to adopt IFRS, we propose:

H1 *Countries with lower Power Distance Index are more likely to adopt IFRS.*
H2 *Countries with lower Individualism Index are more likely to adopt IFRS.*
H3 *Countries with lower Uncertainty Avoidance Index are more likely to adopt IFRS.*
H4 *Countries with lower Masculinity Index are less likely to adopt IFRS.*

RESEARCH DESIGN

Research Model

We apply an ordinary least square (OLS) model, which is defined as:

$$Y_i = \beta_0+\beta_1 AID_i+\beta_2 MCAP_i+\beta_3 ENROL_i+\beta_4 FDI_i+\beta_5 GDP_i - \beta_6 PDI_i - \beta_7 UAI_i - \beta_8 IDV_i + \beta_9 MAS_i + e_i$$

Where: Y is the level of adoption of IFRS, β_0 is the intercept, β_1-β_9 are the slopes/regression weights that represent the relationships between dependent variable and independent variables, and the following are the controlling variables: *ODA* is countries` foreign aid, *MARCAP* is countries` stock market capitalization, *ENROL* is countries` level of education, *FDI* is countries` foreign direct investment inflows, and *GDP* is the countries` gross domestic product growth rate. Our cultural independent variables represented in the model are as follows: *PDI* is countries` Power Distance Index, *UAI* is countries` Uncertainty Avoidance Index, *IDV* is countries` Individualism Index, and *MAS* is countries` Masculinity Index.

Table 1: Selected Attributes of Hofstede's Cultural Dimensions

Small Power Distance	Large Power Distance
1. Inequalities among people should be minimized. 2. Social relationships should be handled with care. 3. Less powerful people and more powerful people should be interdependent. 4. Less powerful people are emotionally comfortable with interdependence	1. Inequalities among people are expected and desired. 2. Status should be balanced with restraint. 3. Less powerful people should be dependent. 4. Less powerful people are emotionally polarized between dependence and counter dependence.
Collectivism	**Individualism**
1. People are born into extended families or other in-groups that continue protecting them in exchange for loyalty. 2. Value standards differ for in-groups and out-groups: exclusionism. 3. Harmony should always be maintained and direct confrontations avoided. 4. Friendships are predetermined and resources should be shared.	1. Everyone grows up to look after him- or herself and his or her immediate (nuclear family) only. 2. The same value standards are supposed to apply to everyone: universalism. 3. Speaking one's mind is a characteristic of an honest person. 4. Friendships are voluntary and should be fostered, and resources are owned

Table 1: Selected Attributes of Hofstede's Cultural Dimensions	
	individually.
Weak Uncertainty Avoidance	**Strong Uncertainty Avoidance**
1. Uncertainty is a normal feature of life, and each day is accepted as it comes. 2. Comfortable in ambiguous situations and with unfamiliar risks. 3. Few and general laws or unwritten rules. 4. There should be no more rules than strictly needed.	1. The uncertainty inherent in life is a continuous threat that must be fought. 2. Acceptance of familiar risks; fear of ambiguous situations and of unfamiliar risks. 3. Many and precise laws or unwritten rules. 4. There is an emotional need for rules, even if they will not work.
Femininity	**Masculinity**
1. Immigrants should integrate. 2. International conflicts should be resolved by negotiation and compromise. 3. Relationships and quality of life are important. 4. The environment should be preserved: small is beautiful.	1. Immigrants should assimilate. 2. International conflicts should be resolved by a show of strength or by fighting. 3. Challenge, earnings, recognition, and advancement are important. 4. The economy should continue growing: big is beautiful.
Source: (Hofstede, Hofstede, & Minkov, Cultures and Organizations: Software of the minds. Intercultural Cooperation and Its Importance for Survival, 2010)	

Table 2: Hofstede's Cultural Dimensions and the IFRS Adoption	
Cultural Dimensions	**IFRS Adoption**
Small PDI Large PDI	Adopt Not Adopt
Weak IDV Strong IDV	Adopt Not Adopt
Weak UAI Strong UAI	Adopt Not Adopt
Weak MAS Strong MAS	Not Adopt Adopt
Source: The Author, based on Hofstede, Hofstede, & Minkov (2010)	

Besides OLS, for the sake of robustness of our models and to address aforementioned methodological issues raised by Baskerville (2003) and Hofstede (2003), we employ the following additional methods of parameter estimation: (1) instrumental variables of two stage least squares (2SLS) to deal with the potential problem of endogeneity or simultaneity; (2) Generalized Method of Moments (GMM) to ascertain the semi-parametric estimation's results that are efficient, consistent, and unbiased; and (3) Generalized Linear Models (GLM) to anticipate the Maximum Likelihood optimization.

To address the possibility of non-linear relationships between dependent and independent variables, a logistic regression is employed. This regression is used to not only increase the robustness of the model, but also to accommodate the binomial-discrete dependent variables.

The logistic regression is defined as:

$$log\left(\frac{Y_i}{1-Y_i}\right) = b_0 + b_1 AID_i + b_2 MCAP_i + b_3 ENROL_i + b_4 FDI_i + b_5 GDP_i - b_6 PDI_i - b_7 UAI_i + b_8 IDV_i + b_9 MAS_1 + e_i$$

Where: Y is the level of adoption of IFRS, β_0 is the intercept, β_1-β_9 are the slopes/regression weights that represent the relationships between dependent variable and independent variables, and the following are the controlling variables: *ODA* is countries` foreign aid, *MARCAP* is countries` stock market capitalization, *ENROL* is countries` level of education,

FDI is countries` foreign direct investment inflows, and *GDP* is the countries` gross domestic product growth rate. Our cultural independent variables represented in the model are as follows: *PDI* is countries` Power Distance Index, *UAI* is countries` Uncertainty Avoidance Index, *IDV* is countries` Individualism Index, and *MAS* is countries` Masculinity Index.

Variables

To capture developing countries decision we use the Deloitte - IASPlus (2010) report. The report by far is the most comprehensive survey of countries` status of IFRS adoption. We follow the coding of IFRS adoption status of previous works of Hope, Jin, and Kang (2006), Judge, Li, and Pinsker (2010), and Lasmin (2011) that a country is codified "1" if it fully adopts IFRS, where all listed domestic and international firms are required to use the standards; otherwise it is codified "0". Consequently, a country that partially adopts IFRS, either by not requiring all listed firms to use IFRS or by adopting a modified IFRS, is codified "0". Specifically, we use 2006 to 2008 IFRS adoption status. Besides this dichotomous "adopter" and "non adopter" system, we also explore other possibilities of coding, such as "2" for "full adopter", '1" for "partially adopter" and "0" for "non adopter"; and "3" for "IFRS is required"; "2" for "IFRS is required for some firms", "1" for "IFRS is permitted", and '0" for "IFRS is not permitted".

The predictors to countries adoption status are derived from Hofstede (2001)'s cultural dimensions of large versus small power distance (*PDI*), strong versus weak uncertainty avoidance (*UAI*), individualism versus collectivism (*IDV*), and low versus high nurturing or masculinity versus femininity (*MAS*). Hofstede later identified other national cultural dimensions, long-term orientation and indulgence versus restraint, which are not used in this study due to limited examinations on their connections to accounting values. All dimensions are available in the form of indices retrieved from latest list in the Hofstede recent book "Cultures and Organizations: Software of the minds: Intercultural Cooperation and Its Importance for Survival" (Hofstede, Hofstede, & Minkov, 2010).

As explained in the previous section, we are trying to establish the relationships between developing countries decision to or not to adopt IFRS and their cultural aspects in an integrative model. By integrative model, we mean a model that includes not only economic pressures, but also social pressures to examine developing countries decision to adopt or not to adopt IFRS. Social pressures are represented by three forms of isomorphic changes: coercive, mimetic, and normative isomorphism (DiMaggio & Powell, 1983); whereas economic pressures include countries' macroeconomic performances. Please refer to Lasmin (2011) for a more in-depth explanation of this integrative model.

These economic and social pressures, serving as controlling variables, constitute five variables, three variables represent social pressures and two variables represent economic pressures. The first social pressure stems from coercive isomorphism, external pressures that significantly control developing countries' resources, represented by total foreign aid as a percentage of GDP. The second social pressure is mimetic isomorphism, mimicking processes due to increasing openness of countries' economy, corresponded with the level of significance of

countries' capital markets that is related to market capitalization as a percentage of GDP. The third social pressure, normative isomorphism, is associated with cognitive bases constructed by accounting professionals and countries' level of education. We opt to use the enrollment of secondary schools as a percentage of total population. To represent the economic pressures, we use the FDI inflows as a percentage of GDP and the growth of GDP. Data for all controlling variables are in the year 2006-2008 and are calculated using data from the World Bank`s World Development Indicators (World Bank, 2010).

RESULTS

Sample Description

We use United Nations Development Program (UNDP) `s classification of countries report (UNDP, 2010) to distinguish developing countries from developed countries. Initially, 128 developing countries were included into our sample. However, 47 countries do not have sufficient information about the status of their adoption of IFRS. Hence, our final sample consists of 81 developing countries. Table 3 presents selected countries included into our study and their adoption status: (1) countries that fully adopt IFRS (require the use of the full set of IFRS to all listed companies), (2) countries that partially adopt IFRS (allow but not require the use of IFRS or require IFRS to some companies), (3) countries that do not adopt IFRS (do not permit the use of IFRS).

Table 3: Countries Sampled and Their Adoption Status

IFRS is not permitted		IFRS is allowed	IFRS is required to some firms	IFRS is required	
Argentina	Iran	Bolivia	Belarus	Armenia	Macedonia
Azerbaijan	Malaysia	Dominica	Guatemala	Bosnia	Malawi
Bangladesh	Mali	El Salvador	Morocco	Botswana	Mauritius
Benin	Mexico	Lao PDR	Mozambique	Costa Rica	Montenegro
Bhutan	Moldova	Lesotho		Croatia	Namibia
Brazil	Niger	Maldives		Dominican	Nepal
Burkina Faso	Pakistan	Paraguay		Republic	Nicaragua
Chile	Philippines	Sri Lanka		Ecuador	Panama
China	Syria	Swaziland		Egypt	Papua New G.
Colombia	Togo	Turkey		Fiji	Peru
Cote d'Ivoire	Tunisia	Uganda		Georgia	Serbia
India	Uruguay	Zambia		Ghana	Sierra Leone
Indonesia	Uzbekistan	Zimbabwe		Guyana	South Africa
	Vietnam			Honduras	Tajikistan
				Jamaica	Tanzania
				Jordan	Trinidad and
				Kazakhstan	Tobago
				Kenya	Ukraine
				Kyrgyz Rep.	Venezuela,
				Lebanon	RB

Source: (IASPlus, 2010)

Multivariate Results

Table 4 shows the descriptive statistics of all variables. Foreign aid is independent variable that has strongest correlation with IFRS adoption, followed by cultural variable of

power distance, individuality versus collectivity, and masculinity versus femininity, and economic pressures of FDI inflows, and social pressures of market capitalization and level of education. Uncertainty avoidance and GDP growth have weakest correlation with IFRS adoption. We take natural logarithm transformation of all independent variables to reduce their skewness.

Table 4: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max	Corr. to Adoption
Adoption	1.588629	1.359038	0	3	1
ODA	0.813622	1.950429	-5.031808	5.224203	0.3879
MARCAP	3.212963	1.261317	-1.355528	6.235148	-0.0951
ENROL	4.047509	0.574114	2.264962	4.735198	-0.0717
FDI	1.266459	1.225997	-6.266954	3.846498	0.1141
GDP	1.542455	0.789455	-4.856970	3.540959	0.0157
PDI	4.240164	0.220999	3.555348	4.644391	-0.1865
UAI	4.104162	0.396699	2.564949	4.615120	-0.0473
IDV	3.200423	0.526411	1.791759	4.174387	-0.1673
MAS	3.873950	0.246399	3.044523	4.290460	-0.1349

Table 5: Regression Results

	Coefficient	OLS	2SLS	GMM	GLM	Logit	
ODA	0.1620891	***	***	***	***	0.9592904	***
MARCAP	-0.0270628					-0.1388274	
ENROL	0.5019318	**	***	**	**	2.8185750	***
FDI	0.0240970					0.2208367	
GDP	0.0366328					0.2569850	
PDI	-0.4843630	*	**	**	*	-2.8591780	*
UAI	-0.2754604		*	**		-1.9556220	
IDV	-0.1820434	*	*	*	*	-1.2838680	**
MAS	0.0121143					-0.2734912	
Intercept	2.1641490					13.4889	
N	80					80	
R-squared	0.3007					0.2688	

Note: ***p<0.01; **p<0.05; *p<0.1; IFRS is coded "1" if a country fully adopt IFRS, "0" if otherwise; OLS: Ordinary Least Squares, 2SLS: Two Stage Least Squares, GMM: Generalized Method of Moments; GLM: Generalized Linear Models.

The results of multivariate analysis that are shown in Table 5, Table 6 and Table 7, reveal that cultural attributes compared to economic pressures are better predictors to developing countries decision to adopt or not adopt IFRS. While none of proxies for economic pressures are found to be significant towards IFRS adoption, we reveal that developing countries with lower PDI, lower UAS, and lower IDV are more likely to adopt IFRS. Additionally, we show that social pressures of isomorphic changes, especially foreign aid and level of education, are predictors that have strongest relationships with IFRS adoption. However, we cannot confirm the significance of MAS to the developing countries decision to adopt or not to adopt IFRS. Moreover, we show empirical fact that differing strength of influences to countries IFRS adoption decision implies that various "slices" in national accounting ecology of developing countries are not in equilibrium.

Table 6: Regression Results Adjusted A								
	Coefficient	OLS	2SLS	GMM	GLM		Multinomial logit	
							Adoption:"2"	
ODA	0.3089049	***	***	***	***		1.0160850	***
MARCAP	-0.0271166						-0.1106054	
ENROL	0.8851321	**	**	**	**		2.8548220	**
FDI	0.0797863						0.3371838	
GDP	0.0404663						0.1933053	
PDI	-0.8882013	*	**	**	*		-2.8900200	*
UAI	-0.4516262			*			-1.9463660	
IDV	-0.3072206						-1.2034490	*
MAS	-0.0456413						-0.4026399	
Intercept	4.1945610			*			13.8604000	
N	80						80	
R-squared	0.2972						0.2079[a]	

Note: ***p<0.01; **p<0.05; *p<0.1; IFRS is coded "2" if a country fully adopt IFRS, "1" if requires IFRS to some companies or allows the use of IFRS, "0" if does not permit the use of IFRS; The base outcome for multinomial logistic regression is "0"; Multinomial logistic regression of dependent variable that is coded "1" is not shown due to its insignificance; [a]Pseudo R^2

Table 7: Regression Results Adjusted B							
	Coefficient	OLS	2SLS	GMM	GLM	Multinomial logit	
						Adoption: "1"	
ODA	0.450004	***	***	***	***	1.765553	
MARCAP	-0.058192					1.237767	
ENROL	1.375501	**	***	**	**	-3.726360	
FDI	0.119621					-0.559963	
GDP	0.117201					-0.544224	
PDI	-1.391706	*	**	**	**	1.261093	
UAI	-0.864902	*	*	**	*	21.213330	**
IDV	-0.541758	*	*	*	*	6.152055	*
MAS	0.021404					-3.585072	
Intercept	6.942867					-90.670390	
N	80					80	
R-squared	0.2925					0.4357	

Note: ***p<0.01; **p<0.05; *p<0.1; IFRS is coded "3" if a country fully adopt IFRS, "2" if requires IFRS to some companies, "1" if permits the use of IFRS, "0" if does not permit the use of IFRS; The base outcome for multinomial logistic regression is "0"; Multinomial logistic regression of dependent variable that is coded "2" and "3" are not shown due to their insignificance; [a]Pseudo R^2.

CONCLUSION

This paper provides empirical evidence of the influence of national culture on developing countries decision to adopt or not to adopt IFRS. The significance of this study is that we put cultural dimensions together with societal factors and economic factors into an integrative framework. The integrative framework increases our confidence that we are able to isolate the genuine influence of cultural dimensions to the IFRS adoption decision. We show that national culture and societal factors, compared to economic pressures, play more significant roles in shaping developing countries decision to adopt or not to adopt IFRS. Specifically, we reveal that countries having lower Power Distance Index, lower Uncertainty Avoidance Index, and lower Individualism Index are more likely to adopt IFRS. Countries having higher level of foreign aid and higher level of education are also found to be more likely to adopt IFRS. However, countries with higher Foreign Direct Investment (FDI) inflows and Gross Domestic Product (GDP) growth

are found to be not interested to adopt IFRS. The results hint that national accounting ecology of developing countries is not in equilibrium.

We admit it should be noted that our study rely heavily on highly contested cultural dimensions and on archival data. However, we try to address these issues by utilizing various scheme of adoption status and various regression estimation models. Overall, we are confident that our aim to examine whether developing countries accounting environmental factors, especially culture, has significantly influenced their accounting system and development; and together with institutional and economic factors, are in equilibrium or not, has been fruitful.

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AN ANALYSIS OF A SIGNALLING MODEL OF CORPORATE PHILANTHROPY FOR SELECTED PHILIPPINE BANKS

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ABSTRACT

This study attempts to determine whether a signaling model of corporate philanthropy exists in the Philippine banking industry. Using an index of philanthropy and testing it against various firm and industry specific variables, the results affirm that advertising expense is a good signal of philanthropy. However, philanthropic activity in the Philippine banking industry appears to be more dependent on higher or increased revenues rather than a part of the bank's overall strategy. Results further suggest the need for more disclosure and higher philanthropic spending relative to revenues.

INTRODUCTION

Recent calamities in the Philippines have re-awakened the spirit of giving among individuals and corporations alike. For instance, donations to the Philippine Red Cross alone for victims of Typhoon Sendong have reached almost P 100 million as of the end of December 2011 and donation drives continue as of this writing.

What is significant about these donations is not only that it is across individuals and corporations, but majority of these donations are in the form of cash. This indicates not only that the spirit of "bayanihan" (camaraderie; care for others) still exists but in spite a challenging economic situation, people were willing to share whatever resources they have.

This expression of giving is often considered as a form of philanthropy. And while many motives are attributed to such a gesture (such as the warm glow effect), philanthropy can also be seen as a first step towards good corporate citizenship and corporate governance. This study intends to adopt a signaling model of corporate philanthropy where it is more prevalent in industries with higher competition like the Philippine banking industry.

The model starts with an index of philanthropy commonly used in social investing. The index is then tested against the bank's advertising expense as a median against other banks and as a function of the bank's net income. Finally, a third model is made that tests profitability against other control variables and the philanthropy index.

RECENT STUDIES IN CORPORATE PHILANTHROPY

Since Friedman's 1993 assertion of what a firm's responsibility is to society, countless studies have been made in defining what makes a "good" corporate citizen. Citing Reidenbach and Robin, Teehankee (as included in Santos, 2011) traces the five stages of corporate moral

development: the amoral (winning at any cost); the legalistic (concerned with the law, but not the spirit); the responsive (being responsible because it is expedient, not because it is right); the emergent ethical (seeks to instill the social contract throughout the corporation); and the ethical (balances profits and ethics). It is assumed in the stages that it is evolutionary and that companies strive to eventually become ethical in the future.

In developing an altruistic model of corporate social responsibility, Small and Zivin (2005) noted that firms that advertise their social and environmental good works in effect solicit charitable contributions from customers, employees, investors and other stakeholders. As a result, a choice develops among investors between corporate philanthropy and direct charitable giving, but overall there is no change in corporate valuations and the overall supply of good works. Fioravante (2010) observes on the other hand that corporate philanthropy is a viable strategic option in developing marketing strategies, a view that was proven empirically by Brammer and Millington in 2005. Using a large cross-section of UK companies, they were able to show that those which had higher philanthropic expenditures tend to have good reputations and that reputational indices reflect financial performance over other factors. In examining press release donations of US companies during the 2004 tsunami in Southeast Asia, Patten (2008) was able to discover a significant 5-day cumulative abnormal return. And while the timing of press releases did not seem to have influenced the return, the size of the donations did.

Citing previous studies by Dahl and Lavack (1999), Strahilevitz (1999), Ellen, et al (2000), Olsen, et al (2003), Valor (2003) observed favorable public perception and higher purchase intentions for corporations that make sizeable monetary contributions Werbel and Wortman (2000) noted that total annual philanthropy and allocations to educational philanthropy tend to increase following negative media exposure and suggest that companies may use corporate philanthropy to counter negative portrayals.

Bartkus, Morris, and Seifert (2002) found out that while charitable contributions are justified on strategic grounds, extremely large contributions maybe perceived by some shareholders as unnecessary and may even curtail its implementation.

On a global scale Muller and Whiteman (2009) found that while corporate response to disasters may have raised philanthropy to a new level, it remains and understudied phenomenon. Models are needed to determine the appropriate corporate response to such disasters and other similar developments.

Recent studies in the banking industry particularly that of Soana (2011) revive previous findings that even with the existence of updated measurements and indices to measure corporate social performance and corporate financial performance, there seems to be significant link between the two. Garcia de los Salmones, Perez, and Del Bosque (2009) found that while ethical and social dimensions have an indirect impact on bank loyalty, corporate philanthropy improves identification with the bank. The lack of unanimity of the literature on the relationship between corporate philanthropy and financial performance is highlighted in Wang, Choi, and Li's (2008) suggestion that the relationship is not only curvilinear, but even U-shaped.

Fisman, Heal, and Nair (2005) proposed a signaling model of corporate philanthropy that uses a firm's advertising expense as the signal. In their study, preliminary empirical tests support their hypothesis that corporate philanthropy and profits are positively related in industries with

high advertising intensity and high competition something that is present in the Philippine banking industry.

THE PHILIPPINE BANKING INDUSTRY AND THE SAMPLE BANKS

The Philippine banking system is composed of universal and commercial banks, savings and thrift banks (including development), rural and cooperative banks, and non-bank financial institutions (with quasi-banking functions). As of March 2011, the Central Bank of the Philippines (Bangko Sentral) supervises close to 25,000 head offices and branches, 65% of which are non-bank financial institutions.

A breakdown of the banking institutions shows that 38 (with a total of 4,695 branches and offices) are considered universal, 19 (with a total of 563 branches and offices) are considered commercial, 73 (with a total of 1,419 branches and offices) are considered savings and thrift, and 635 (with a total of 2,756 branches and offices) are considered rural and cooperative.

Since the data for this study is limited to what is contained in the website and the annual reports, the initial list included only the universal, commercial, and savings and thrift banks or a total of 130. A content check of these banks significantly lowered the number in the final list since the websites, the annual report, and other public documents did not fully disclose their advertising expenses and/or their donations. We attempted to use 2010 financial data but the final list included only 22 banks as some banks either did not have their annual/financial reports or had incomplete data.

Thus for this study, we were able to get a complete set for only 30 banks using 2009 financial data. The list of the banks is found in Appendix A.

Of the 30 banks in the sample, 16 are universal banks, 5 commercial banks, and the rest are savings and thrift banks. The median age of these banks is 46 years, the oldest at almost 160 years and the youngest at 10 years. These 30 banks spent a total of almost Php3.8 billion in advertising and promotion, the median at about Php15.2 million. 17 of the banks were listed in the Philippine Stock Exchange as of the December 2009.

CREATING AN INDEX OF PHILANTHROPY

In the study of Fisman, Heal, and Nair, an index of philanthropy was created using the Domini Social Index, considered as the world's first and largest screened index. The index is formed from a set of "community-oriented screens:"

1. Generous giving: The Company has consistently given 1.5% of trailing three-year net earnings before taxes to charity, or has otherwise been notably generous in its giving.
2. Innovative giving: The Company has a notably innovative giving program which supports nonprofit organizations particularly those promoting self sufficiency among the economically disadvantage. In the Philippines, several banks have a specific foundation named after their bank.

3. Support for Housing: The Company is a prominent participant is public/private partnerships that support housing initiatives for the economically disadvantaged. Involvement in Gawad Kalinga and Habitat for Humanity is included in this criterion. Employee housing programs are not included because this is considered a benefit rather than an active involvement in philanthropy.

In the Philippines, only the member companies of the Philippine Business for Social Progress keeps a record of generous giving. To replace the generous giving criterion, we use a support for education criterion since many of these banks have a specific program for the purpose. In fact many banks are in the forefront of programs that promote education and youth empowerment from scholarship programs and book donations, to best teacher and faculty recognition/searches. The index retained the innovative giving criteria as well as the support for housing.

The index rates the banks from 0 (lowest) to 3. In case where there is partial description of the involvement, half a point was given. Those ranked zero were those banks that did not specifically mention anything about their philanthropic activities. It does not mean, however, that these banks are not involved in some form of philanthropic activity. In fact, in the donation drive for Typhoon Sendong, several companies including the banks in the sample were donating for the first time.

CREATING THE OTHER METRICS

This study also created other metrics which are described below:

1. Metric for visibility to consumers – the Fisman, Heal, and Nair model suggests the use of median of the advertising to sales ratio. We will use two measurements of visibility, the median of the advertising expenses of the 30 banks, which will be the industry indicator, and the advertising to sales ratio, which will be the firm-specific indicator.
2. Measures of profitability – this study will use the banks' return on assets, which is the net interest income divided by the book value of the assets.
3. Other metrics and variables – this study will also the following measures:
    - 3.1 Sales revenue – log of the net interest income
    - 3.2 Cash holdings – cash on hand divided by the book value of the assets
    - 3.3 Depreciation – depreciation and amortization expense divided by the net interest income
    - 3.4 Segments – number of business segments. Universal banks have four general segments: commercial, investment, private, and others. Commercial banks will be rated 3, and savings and thrift banks and development banks, will be rated 2.
    - 3.5 Age – log of incorporation
    - 3.5 Listed – dummy variable; 1 for listed, 0 if not

MODEL DEVELOPMENT

The first equation will be regressing philanthropy (as measured by the index) with the median of the advertising expenses (industry measurement) and the advertising to net interest income ratio (firm-specific measurement):

$$Philanthropy_I = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta \log(\text{Net Interest Income}) + \varepsilon_I \qquad (1)$$

Where: I is the index for the different banks
X_1 is the median of the advertising expenses
X_2 is the advertising to net interest income ratio

The second equation will be regressing profitability as measured by the return on assets (ROA) with the index of philanthropy and the other metrics:

$$Profit_{iy} = \alpha_y + \beta_1 Philanthropy_I + Controls_{iy} + \varepsilon_{iy} \qquad (2)$$

Where: *Profit* is the ROA
α_y is a fixed year effect
Controls are the firm-level controls or metrics

RESULTS AND ANALYSIS

The results of the first regression model show a positive significant relationship between philanthropy and net interest income and the ratio of advertising expense to net interest income. This implies that advertising expense and net interest income are good signals of predicting corporate philanthropy in the banking industry. It supports the original hypothesis of Fisman, Heal, and Nair that corporate philanthropy and profits are positively related in industries with high advertising intensity.

Figure 1: Predicting Philanthropy – Results of Initial Regression

```
. regress philanthropy advindex advratio logNII
```

Source	SS	df	MS		
Model	22.3427767	3	7.44759224	Number of obs	= 30
Residual	13.0238899	26	.500918844	F(3, 26)	= 14.87
				Prob > F	= 0.0000
Total	35.3666667	29	1.21954023	R-squared	= 0.6317
				Adj R-squared	= 0.5893
				Root MSE	= .70776

philanthropy	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
advindex	.0000322	.000096	0.34	0.740	-.000165	.0002295
advratio	1.961104	.7740025	2.53	0.018	.3701187	3.552088
logNII	1.108172	.2326	4.76	0.000	.6300561	1.586289
_cons	-8.931392	2.136116	-4.18	0.000	-13.32224	-4.540542

When regressed against firm and industry specific metrics, none of the variables are significant indicators against philanthropy as seen in Figure 2. Nonetheless, the negative

relationship of cash balances to philanthropy and the positive relationship of the other variables are supported by many previous studies and are intuitive in nature.

Figure 3 further supports the claim that a bank's return on assets is a significant indicator of advertising expense and the negative relationship affirms the intuition that higher levels of net interest income support increasing levels of advertising expense.

The negative relationship (although not significant) of being listed (a dummy variable) in the Philippine Stock Exchange and the philanthropic index deserves to be investigated further. This is the reason why part of the analysis is to test the relationship of this index against various factors for listed firms only. This is seen in results found in Figures 4 – 6.

It is also noteworthy that higher levels of net interest income allow banks to keep higher cash balances and that this relationship is very significant. Thus, it would appear that higher cash balances are kept by banks rather than donate or spend it on philanthropy. This is indicative that there appears to be a limit to philanthropy, a finding made by Bartkus, Morris, and Seifert in 2002. However, it could also be that higher cash balances indicate the overall liquidity position of the Philippine banking industry as a result of the Global Financial Crisis.

For banks listed in the Philippine Stock Exchange, only net interest income is the significant predictor of philanthropy. This indicates that the listed banks would probably need to spend more in order for their philanthropic activities to be further noticed by the public. As shown by Valor in 2003 more spending is associated with favorable reputation and customer loyalty.

Figure 2: Indicators of Philanthropy Using Industry and Firm Specific Metrics

```
. regress philanthropy advindex cashratio depreciation segments logAge ROA listed logNII
> advratio
```

Source	SS	df	MS		
Model	23.1665617	9	2.57406241	Number of obs	= 30
Residual	12.200105	20	.61000525	F(9, 20)	= 4.22
				Prob > F	= 0.0035
Total	35.3666667	29	1.21954023	R-squared	= 0.6550
				Adj R-squared	= 0.4998
				Root MSE	= .78103

philanthropy	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
advindex	.0000853	.0001315	0.65	0.524	-.0001889	.0003596
cashratio	-5.705926	6.873124	-0.83	0.416	-20.04301	8.63116
depreciation	.0776953	.3856484	0.20	0.842	-.7267531	.8821436
segments	.3380255	.4214343	0.80	0.432	-.541071	1.217122
logAge	.1091783	.561816	0.19	0.848	-1.062749	1.281106
ROA	8.758238	27.12289	0.32	0.750	-47.81912	65.3356
listed	-.095596	.4344888	-0.22	0.828	-1.001924	.8107317
logNII	.6209258	.6142365	1.01	0.324	-.6603491	1.902201
advratio	1.282407	1.662684	0.77	0.450	-2.185892	4.750706
_cons	-5.511112	4.615526	-1.19	0.246	-15.13893	4.116707

Figure 3: Net Interest Income as an Indicator of Advertising and Philanthropic Activity

```
. regress ROA philanthropy advindex cashratio depreciation segments logAge listed logNII
> advratio
```

Source	SS	df	MS		
Model	.00879751	9	.000977501	Number of obs	= 30
Residual	.000824904	20	.000041245	F(9, 20)	= 23.70
				Prob > F	= 0.0000
Total	.009622414	29	.000331807	R-squared	= 0.9143
				Adj R-squared	= 0.8757
				Root MSE	= .00642

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
philanthropy	.0005922	.0018339	0.32	0.750	-.0032333	.0044176
advindex	-2.20e-06	9.76e-07	-2.25	0.036	-4.23e-06	-1.64e-07
cashratio	.1738306	.0423475	4.10	0.001	.0854952	.2621659
depreciation	-.0082156	.0025887	-3.17	0.005	-.0136156	-.0028155
segments	.0002257	.0035203	0.06	0.950	-.0071176	.0075689
logAge	-.0020497	.0046013	-0.45	0.661	-.0116479	.0075484
listed	-.001183	.0035672	-0.33	0.744	-.0086241	.0062581
logNII	.0063096	.0049823	1.27	0.220	-.0040832	.0167024
advratio	-.0331053	.0117339	-2.82	0.011	-.0575817	-.0086289
_cons	-.0475193	.0378176	-1.26	0.223	-.1264055	.0313669

Figure 4: Predicting Philanthropy for Listed Banks

```
. regress philanthropy advindex advratio logNII
```

Source	SS	df	MS		
Model	15.0301176	3	5.01003921	Number of obs	= 17
Residual	4.52870589	13	.348361991	F(3, 13)	= 14.38
				Prob > F	= 0.0002
Total	19.5588235	16	1.22242647	R-squared	= 0.7685
				Adj R-squared	= 0.7150
				Root MSE	= .59022

philanthropy	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
advindex	.000149	.0001169	1.27	0.225	-.0001036	.0004016
advratio	-27.23664	17.6707	-1.54	0.147	-65.41187	10.93858
logNII	1.125925	.241125	4.67	0.000	.6050058	1.646844
_cons	-8.715313	2.285398	-3.81	0.002	-13.65262	-3.77801

As also shown in Figure 2, none of the industry and firm specific metrics is a good indicator of philanthropy for listed banks, based on Figure 5 on the following page.

Figure 6 further supports the findings in Figure 4 that for listed banks net income is not a significant indicator of advertising expense or philanthropy. There are several reasons why this is possible. First, most of the advertisements of Philippine banks highlight their products and services and very little on their philanthropic activities. Second, these philanthropic activities are reflected as news and/or in their annual reports. Most of the listed universal and commercial banks have what is called corporate governance report or a "sustainability report" that outlines their philanthropic and other social involvement activities, but these reports are not advertisements in nature. Third, philanthropy is not fully incorporated in the bank's overall strategy.

Figure 5: Indicators of Philanthropy Using Industry and Firm Specific Metrics for Listed Banks

```
. regress philanthropy advindex cashratio depreciation segments logAge ROA logNII advrati
> o
```

Source	SS	df	MS	Number of obs =	17
Model	17.0460291	8	2.13075364	F(8, 8) =	6.78
Residual	2.51279438	8	.314099297	Prob > F =	0.0069
				R-squared =	0.8715
				Adj R-squared =	0.7431
Total	19.5588235	16	1.22242647	Root MSE =	.56045

philanthropy	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
advindex	.0000865	.0001586	0.55	0.600	-.0002792	.0004522
cashratio	-1.687088	9.024975	-0.19	0.856	-22.49872	19.12454
depreciation	.8120687	.4006882	2.03	0.077	-.1119199	1.736057
segments	-1.187306	.6486878	-1.83	0.105	-2.683183	.3085711
logAge	-.409028	.6486798	-0.63	0.546	-1.904886	1.08683
ROA	49.61416	29.52057	1.68	0.131	-18.46039	117.6887
logNII	2.587737	.9275875	2.79	0.024	.4487159	4.726757
advratio	-26.18811	20.70801	-1.26	0.242	-73.94086	21.56465
_cons	-18.34403	6.710977	-2.73	0.026	-33.81957	-2.868493

Figure 6: Net Interest Income as an Indicator of Advertising and Philanthropic Activity for Listed Banks

```
. regress ROA advindex cashratio depreciation segments logAge logNII advratio
```

Source	SS	df	MS	Number of obs =	17
Model	.002286162	7	.000326595	F(7, 9) =	8.16
Residual	.000360427	9	.000040047	Prob > F =	0.0027
				R-squared =	0.8638
				Adj R-squared =	0.7579
Total	.002646589	16	.000165412	Root MSE =	.00633

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
advindex	-1.75e-06	1.69e-06	-1.03	0.329	-5.58e-06	2.08e-06
cashratio	.1992061	.0773021	2.58	0.030	.0243365	.3740756
depreciation	-.0088491	.0034307	-2.58	0.030	-.0166098	-.0010884
segments	.0018386	.007299	0.25	0.807	-.0146729	.0183501
logAge	-.0003092	.0073239	-0.04	0.967	-.016877	.0162586
logNII	.0040964	.0103845	0.39	0.702	-.019395	.0275878
advratio	-.0720948	.2325876	-0.31	0.764	-.5982445	.4540548
_cons	-.0357117	.0748366	-0.48	0.645	-.2050038	.1335804

The regressions results show mixed support for the study of Fisman, Heal, and Nair. While advertising expenses is a significant indicator or predictor of philanthropy for banks and that while higher net interest income leads to higher advertising expenses and eventually philanthropic activity, listed banks need to spend more relative to their earnings.

While listed banks comprise 80% of the almost P 4.0 billion spent in advertising in 2009, these banks almost make up the same ratio to total assets and about 70% of the entire net interest income for the industry. This makes the proposition for listed banks to spend more for philanthropic activities.

Sample size limitations aside, a regression was also made for those banks with complete data for 2010. The results are shown in Figures 7 – 9.

Figure 7: Predicting Philanthropy Using 2010 Financial Information

```
. regress philanthropy advindex advratio logNII

      Source |       SS       df       MS              Number of obs =      22
-------------+------------------------------           F(  3,    18) =   19.25
       Model |  19.2405391     3  6.41351302            Prob > F      =  0.0000
    Residual |  5.9980973     18  .333227628            R-squared     =  0.7623
-------------+------------------------------           Adj R-squared =  0.7227
       Total |  25.2386364    21  1.20183983            Root MSE      =  .57726

------------------------------------------------------------------------------
philanthropy |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    advindex |   .0001453   .0001061     1.37   0.188    -.0000776    .0003683
    advratio |  -18.84756   11.78385    -1.60   0.127    -43.60451    5.909398
      logNII |   1.336064   .2386178     5.60   0.000     .8347468    1.837382
       _cons |  -10.93293   2.198012    -4.97   0.000    -15.55078   -6.31508
------------------------------------------------------------------------------
```

Figure 8: Indicators of Philanthropy using Industry and Firm Specific Metrics using 2010 Financial Information

```
. regress philanthropy advindex logNII cashratio depreciation segments logAge ROA listed
> advratio

      Source |       SS       df       MS              Number of obs =      22
-------------+------------------------------           F(  9,    12) =   13.04
       Model |  22.8967009     9  2.54407787            Prob > F      =  0.0001
    Residual |  2.34193549     12  .195161291           R-squared     =  0.9072
-------------+------------------------------           Adj R-squared =  0.8376
       Total |  25.2386364    21  1.20183983            Root MSE      =  .44177

------------------------------------------------------------------------------
philanthropy |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    advindex |   4.24e-06   .0000992     0.04   0.967    -.0002119    .0002204
      logNII |   1.786295   .4513287     3.96   0.002     .8029344    2.769656
   cashratio |  -1.600207    1.95542    -0.82   0.429    -5.860703    2.660288
depreciation |   .2249962   .2290132     0.98   0.345    -.2739808    .7239732
    segments |  -.5226486   .3304305    -1.58   0.140    -1.242595    .1972975
      logAge |   .1903842   .4205764     0.45   0.659     -.725973    1.106741
         ROA |   4.773861   11.96111     0.40   0.697    -21.28715    30.83487
      listed |   1.215351   .4149436     2.93   0.013     .3112664    2.119435
    advratio |  -9.680047    9.60022    -1.01   0.333    -30.59713    11.23704
       _cons |  -14.73418   3.490134    -4.22   0.001    -22.33852   -7.129827
------------------------------------------------------------------------------
```

Using 2010 financial information, only net interest income had become a significant indictor of philanthropy in banks whereas in 2009 it included advertising expense ratio. Even when regressed against firm and industry measures, only net interest income remained a significant indicator. When ROA is regressed against all measures and philanthropy, none of variables were significant.

The findings in 2010 seem to indicate that only are banks likely to look at their earnings as an indicator of philanthropy, there are appears to be no specific or long-term strategy incorporating philanthropic activities. It could be that philanthropy is still widely viewed for its warm glow effect or even as a venue for tax deductions.

Figure 9: Net Interest Income as an Indicator of Advertising and Philanthropic Activity using 2010 Financial Information

```
. regress ROA philanthropy advindex logNII cashratio depreciation segments logAge listed
> advratio
```

Source	SS	df	MS		
Model	.002137074	9	.000237453	Number of obs	22
Residual	.001346244	12	.000112187	F(9, 12)	2.12
				Prob > F	0.1129
Total	.003483318	21	.000165872	R-squared	0.6135
				Adj R-squared	0.3237
				Root MSE	.01059

ROA	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
philanthropy	.0027442	.0068758	0.40	0.697	-.0122368	.0177252
advindex	-1.89e-06	2.31e-06	-0.82	0.429	-6.94e-06	3.15e-06
logNII	-.0016757	.0164229	-0.10	0.920	-.0374582	.0341069
cashratio	.0263509	.047569	0.55	0.590	-.077293	.1299948
depreciation	-.0100326	.0049179	-2.04	0.064	-.0207479	.0006826
segments	.0068549	.0084814	0.81	0.435	-.0116244	.0253342
logAge	-.0044963	.0100862	-0.45	0.664	-.0264724	.0174797
listed	-.0095383	.0127339	-0.75	0.468	-.037283	.0182063
advratio	.0811519	.2385788	0.34	0.740	-.4386666	.6009704
_cons	.0190707	.1318011	0.14	0.887	-.2680993	.3062407

Another important development in the past several years is the impact of the Global Financial Crisis and the focus of many banks in strengthening their balance sheets through capital build-up, rather than engage in philanthropy. Most Philippine banks have dedicated their resource in improving their risk management capabilities and this might be a reason why there is less effort in other social development activities.

In the area of disclosures, many banks continue to aggregate their philanthropic activities or even donations under miscellaneous expense and thus actual amount are very difficult to isolate. In the case of banks which have foundations, many of these expenses are part of these foundation's expenses rather than the banks themselves.

CONCLUSION AND AREAS FOR FURTHER STUDY

The results support the model of Fisman, Heal, and Nair that advertising expense is a good signal or indicator of corporate philanthropy among Philippine banks. However, the results do not show whether these expenses form an integral part of the overall corporate strategy. Philippine banks look at their involvement in corporate philanthropy more as a function of (an increase in) revenues rather than following Reidenbach and Robin's moral development model.

The results also support that while there have marked improvement in the quality and amount spent for philanthropy by Philippine banks there is a need to further increase it given the increase in revenues the industry had been experiencing over the years.

There is also a need for further disclosure in detail donations made by Philippine banks in their annual reports and in their websites (even if it less than 5% of the total miscellaneous expense). This will allow a more detailed analysis of a bank's philanthropic activities.

An area of further would be to revisit the model and determined if it is prevalent across all industries and sectors. Another study would be to include an index of customer loyalty as

suggested in earlier studies and determine whether philanthropic activities of the bank increase customer loyalty or even attract more customers.

As more and more companies desire to be better corporate citizens, it is important for these companies to integrate giving or donating as part of their overall strategy. The warm glow effect often associated with giving is temporary and a more lasting impact would be for banks to sustain these activities in the future.

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APPENDIX A
List of Banks included in the Study (with complete 2009 financial data)

Al Amanah Islamic Investment Bank
Allied Banking Corporation
Asiatrust Development Bank
Asia United Bank
Banco de Oro
Bank of Commerce
Bank of the Philippine Islands
BDO Private Bank
China Banking Corporation
Chinatrust Commercial Bank
Citystate Savings Bank
Development Bank of the Philippines
East West Banking Corporation
Export and Industry Bank
Landbank of the Philippines
Maybank Philippines
Metropolitan Bank and Trust Company
Philippine Bank of Communications
Philippine Business Bank
Philippine National Bank
Philippine Postal Bank
Philippine Savings Bank
Philippine Trust Company
Philippine Veterans Bank
Planters Development Bank
Rizal Commercial Banking Corporation
Security Banking Corporation
Sterling Bank of Asia
Union Bank of the Philippines
United Overseas Bank

MANAGEMENT ATTITUDES TOWARD ADOPTING INTERNATIONAL ACCOUNTING STANDARDS: HOW JAPANESE MANAGEMENT ATTITUDES CHANGED IN THE PAST DECADES

Dan Hu, Nagoya University

ABSTRACT

This research investigate Japanese managers' attitude toward the adoption of the IFRS in Japanese companies and the changes in attitude over the past ten years after the Accounting Big Bang. The results are as follows. (1) Japanese companies have still been great importance to the domestic stock market after 1997. (2) The difference between Japanese accounting standards and the IFRS has been clearly perceived by management. (3) There is growing consideration that the application of the IFRS for separate and for consolidated financial statements of parent companies should be dealt with separately. (4) Japanese companies have shown a negative attitude to adopting the IFRS. (5) Japanese managers expected that the costs would exceed the benefits for adoption of the IFRS.

INTRODUCTION

The year 2005 represented the beginning of a new era for financial reporting when EU countries required the use of International Accounting Standards (IAS)/International Financial Reporting Standards (IFRS). In addition, during March 2005 in Japan, a joint project on the convergence of Japanese generally accepted accounting principles (GAAP) and IFRS was established to analyze and discuss their equivalencies (Koga & Rimmel, 2006). The same trend can also be observed in other countries with capital markets dealing with cross-border transactions (Godfrey & Chalmers, 2007). This proceeding convergence is assumed to have had a great impact on preparers (managers) and investors, as well as other market participants and the accounting profession. Amid the trend in accounting standards globalization, Japan faces important issues such as whether to adopt IFRS (unification option) or maintain Japanese standards (diversification option). The present study investigated Japanese managers' opinions on issues concerning IFRS adoption and attempted to provide evidence for setting future standards.

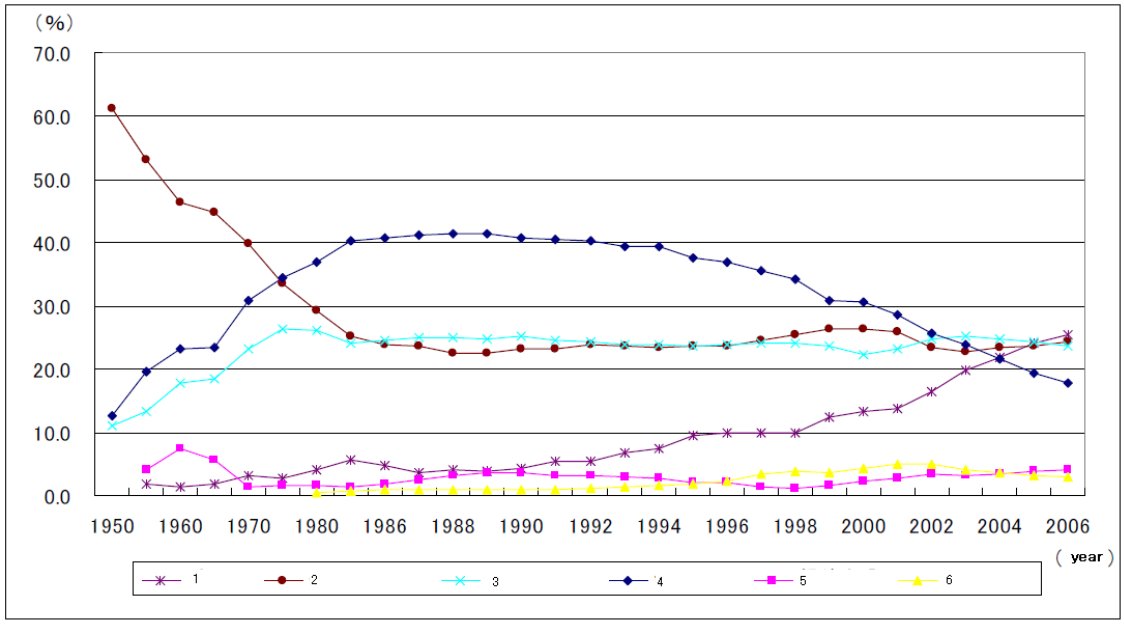
THE CHANGING CORPORATE GOVERNANCE STRUCTURE

During the past ten years, Japan has seen great changes in corporate governance structure, regarded as the promoter of accounting standards globalization. After the Financial Big

Bang, the change in the business environment caused Japanese companies to alter their corporate governance structures toward a global standard, as evidenced in the following three aspects.

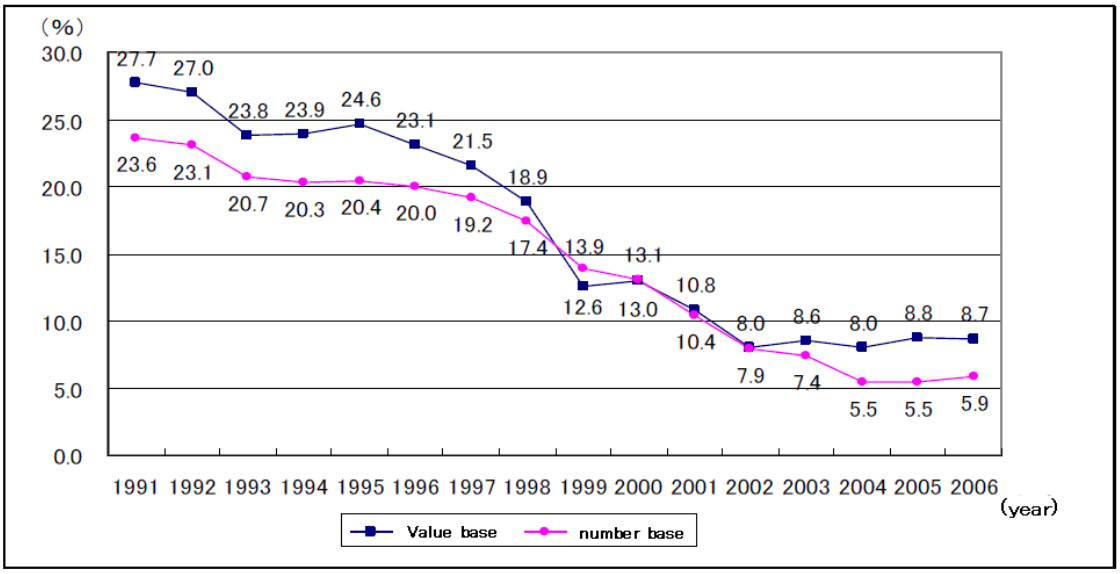
First, foreign ownership increased dramatically, whereas financial institutional ownership showed a decreasing trend. As shown in Figure 1, foreign ownership increased impressively since the end of the 1980s, especially during the most recent five years (2002, 16.5%; 2006, 25.4%) after the Big Bang. In contrast, financial institutional ownership, which increased before the end of the 1980s, began to decrease after the 1990s and declined by 8% from 25.7% in 2002 to 17.7% in 2006.

Figure 1 Change in Ownership



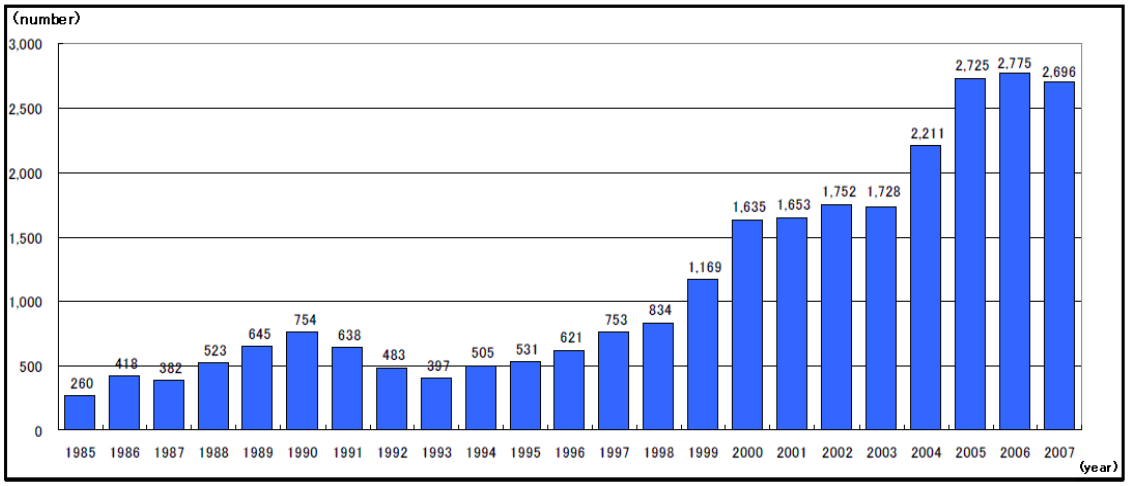
Note: (1) 1: foreign investor; 2: individual and other investor; 3: corporation; 4: financial institution; 5: investment trust; 6: pension fund
(2) The number of stocks is on a stock-trade unit base from 2001.
(3) Investment trusts and pension trusts were not included in financial institutions (however, before 1978, pension trusts were included).
(4) In 2004 and 2005, Livedoor Co., Ltd was excluded.
(Source) Cabinet Office, Government of Japan (2008), p.212.

Figure 2 Change in Cross-holdings



Note: (1) The rate of cross-holding is the rate of cross-holding of listed companies' (including banks) stock to the stock of the total market.
(2) The number of stock on a stock-trade unit base (stock value unit base before 2000).
(3) Livedoor Co., Ltd was excluded in 2004 and 2005.
(Source) Cabinet Office, Government of Japan (2008), p.214.

Figure 3 Change in M&A Activity



(Source) Cabinet Office, Government of Japan (2008), p.214.

Second, the rate of cross-holdings fell dramatically. Figure 2 illustrates that the rate of cross-holdings remained low after the bubble. As measured on a value base, the cross-holding rate declined from 12.6% in 1999 to 8.7% in 2006, and as measured on a stock number base, the rate declined significantly from 1999 (13.9%) to 2006 (5.9%). Moreover, recent years have seen a decrease in non-financial companies' holdings in bank stocks, while banks' holdings of non-financial companies' stock and cross-holdings of non-financial companies stock increased.

However, it should be noted that the cross-holding rate increased slightly from 5.5% in 2005 to 5.9% in 2006, in contrast with the continuous decrease during the nine years since 1997.

Third, M&A activity increased largely since 1999 (see Figure 3), led by an increase in the cross-holding of non-financial companies' stock as well as the start of attributing the responsibility of corporate governance to management.

A Ten-year Period of Moving toward Internationalization

I conducted three similar surveys, one in 1997, one in 2005 and one in 2008, on how Japanese companies regard the internationalization of accounting standards. The first survey was conducted right after the Japanese government made a decision on the basic policy following the Japanese Financial Big Bang, while attempting to eliminate the lack of transparency that has been said to characterize the Tokyo market and improve on globalization by making a commitment to global standards instead of focusing on domestic logic. During the following ten years, Japan implemented extensive reforms in its accounting system and commercial code, and moved toward adopting international standards, a process well known as the "Accounting Big Bang" (since 1999). Through these reforms, Japanese accounting has become quite similar to the IFRS. Notwithstanding, some differences remain in specific accounting standards. During 2002 and 2003, the Japanese Financial Services Agency, the Ministry of Justice, and Nippon Keidanren expressed a negative opinion toward the adoption of the IFRS, while on October 29, 2002, the International Accounting Standards Board and the U.S. Financial Accounting Standards Board jointly issued a memorandum of understanding formalizing their commitment to the convergence of U.S. and international accounting standards. Nippon Keidanren (Japan Business Federation) is a comprehensive economic organization initiated in May 2002 by the amalgamation of Keidanren (Japan Federation of Economic Organizations) and Nikkeiren (Japan Federation of Employers' Associations). Its 1,662 members are comprised of 1,343 companies, 130 industrial associations, and 47 regional economic organizations (as of June 22, 2007). In the meantime, the EU adopted the IFRS as of 2005. With this background, in 2005, I conducted the second survey.

Surprisingly, Nippon Keidanren changed its opinion in favor of convergence with the IFRS in 2006, three years after it expressed a negative opinion toward such an adoption. However, a lack of real progress remained. In 2007, the publication of the SEC's Concept Release on Allowing U.S. Issuers to Prepare Financial Statements in accordance with International Financial Reporting Standards (the Concept Release) and its proposal, Acceptance from Foreign Private Issuers of Financial Statements, prepared in accordance with International Financial Reporting Standards without Reconciliation to U.S. GAAP, found that Japan was excluded from the global trend. After the Big Bang, Japan seemed to lag behind its European and U.S. counterparts in converging with the IFRS. What Japan should do next was a significant issue. With this background, in 2008, I conducted the third survey.

On the one hand, the increasing importance of international capital markets requires complete convergence with the IFRS. Particularly for multinational companies that operate globally, converged accounting standards are considered to be helpful in improving international

finance and management operations. On the other hand, when it comes to the process of adopting the IFRS, many obstacles exist. For example, determinations must be made on how to adopt the IFRS, and whether to focus on overall adoption or an optional adoption, adoption only for consolidated financial statements or for both consolidated and non-consolidated financial statements, and how to deal with specific accounting standards such as R&D, depreciation of goodwill, fair value accounting, etc. Controversy exists among Japanese companies. The management of Japanese companies seems to be cautious about such an adoption. As providers of financial information and preparers of financial statements according to accounting standards in practice, their attitudes may influence the direction, process, and speed of accounting reform.

The decade after the Big Bang saw great changes in the Japanese economy and Japanese business practices, as well as a global trend of convergence of accounting standards. The following questions are interesting and important at a time when Japan is standing at a crossroads in determining the right way to approach the target of accounting globalization.

(1) How do managers of Japanese companies regard the adoption of the IFRS?
(2) Are there any significant differences in management's attitudes over the past ten years toward the adoption of the IFRS?
(3) How did management change their attitude, and what causes such changes, if any?

Exploring these issues helps us understand the specific problems related to globalization of accounting standards, and has implications for the future direction of the development of Japanese accounting standards.

RESEARCH METHOD

Through a postal questionnaire, the present research investigated Japanese managers' attitudes toward the adoption of the IFRS and the current status of the application of the IFRS in Japanese companies. Accounting rules as a kind of social institution should be analyzed and understood in social, legal, and economic contexts. Japan has a different social and legal system as well as different methods of financing as compared with other advanced countries. During the ten years that were significantly influenced by the Accounting Big Bang, Japanese managers' attitudes toward the IFRS may have changed given the changing environment. I conducted two similar investigations in 1997 and 2005 before conducting the 2008 investigation. By analyzing the data from the 2008 investigation and comparing the results with those of the two former investigations, I attempted to provide useful evidence for the future of standards setting.

The questionnaire consisted of three parts:

(1) Opinion on capital markets and users of financial statements;
(2) Attitude toward and opinion on the adoption of the IFRS; and
(3) The present situation regarding the IFRS adoption or application.

The sample selection and collection of responses of each investigation are summarized as follows.

(1) In the 1997 investigation, a questionnaire was forwarded to the CFO or another senior manager in the accounting or treasury department of 753 multinational non-financial companies in 11 countries. Among them were 200 Japanese companies. The selection was based on company size (as measured by sales) from Fortune Global 500 and other companies' lists. Two hundred and twenty-eight useful responses were received, among which were from 84 Japanese companies. The total response rate was 30% while the Japanese company response rate was 42%.

(2) In the 2005 investigation, the sample companies included the top 500 (as measured by sales) companies listed on the Tokyo Stock Exchange. One hundred and twenty-three useful responses were collected (response rate of 24.6%). Since the respondents were spread across a range of different industries and included the largest companies, the data offered a representative sample of the Japanese economy.

(3) The 2008 investigation selected 500 companies, of which 64 were Japanese companies based on sales rank from the Fortune Global 500 of 2006. The questionnaires were sent to the CFO or to senior managers. One hundred and twenty-one useful responses were received (response rate of 24.2%), of which 58 were Japanese companies (response rate of 90.6%).

In the present study, I only compared data on Japanese companies. Although the sample sizes for the 1997 investigation, the 2005 investigation, and the 2008 investigation were different, the subjects in all of these investigations were large companies. As almost all Japanese companies selected were large as measured by sales, there was an overlap in the selected companies for each investigation, even though the scale of each investigation differed. Furthermore, the questionnaires used were similar (the 2008 questionnaire included more questions), enabling a comparison on most of the items. It is worth noting that each investigation's background was quite different. The 1997 investigation was conducted at the start of the Big Bang and the convergence of accounting standards. The 2005 investigation was conducted when interested parties showed a passive stance toward adopting the IFRS, while the 2008 investigation was conducted after agreement with the IASB and Accounting Standards Board of Japan (ASBJ) was reached on overall convergence with the IFRS. The Kruskal-Wallis test was used as the data were not normally distributed.

RESULTS AND ANALYSIS

The respondent percentages reported in this paper were based on the total number of responses to the questions. The design of the questionnaire allowed multiple answers for some questions. Consequently, the combined response percentages for some questions may exceed 100%.

(1) Opinions on capital markets and users of financial statements

The first question sought to establish managers' views on the importance of domestic and overseas stock markets to their companies, as well as the importance of the stock market and the bond market. In the 2005 and 2008 questionnaire, a five-point Likert scale was used as a measurement tool (with 1 = not important at all, 3 = not so important, and 5= very important). In the 1997 questionnaire, a three-point Likert scale was used (1 = very important, 2 = important, 3 = not important). When the 1997, 2005, and 2008 data were compared, the 2005 and 2008 data have been modified to be comparable with the 1997 data.

As shown in Figure 4, the domestic market was regarded by 65% of respondents as being very important to their business activities, while 53% of respondents indicated that the domestic bond market was very important. Overseas markets were not considered to have the same importance as domestic markets, as only 29% of respondent rated overseas stock markets as either important or very important. The majority of the respondents rated overseas markets as being not as important relative to domestic markets. Generally, the domestic stock market was regarded as the most important market compared with other markets.

When the 1997, 2005, and 2008 data were compared, the following two points became clear (see Table 5). First, Japanese companies have still been great importance to the domestic stock market (see the first line of Panel A). Second, it is quite clear that compared with the 2005 data and the 2008 data, Japanese companies attached greater importance to overseas markets in 2008 (see the two lines on the bottom-right corner of Panel B).

Figure 4 Importance of Markets to Japanese Business Operations (2008)

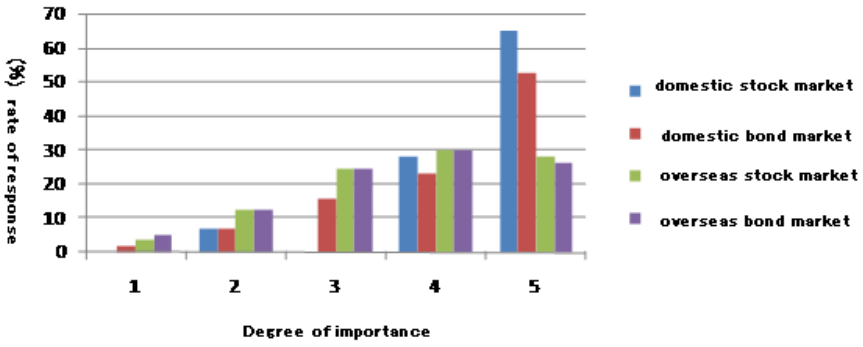


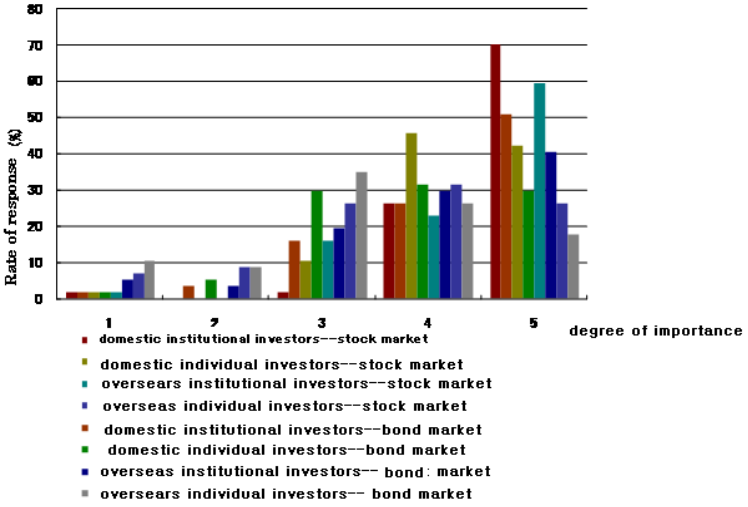
Table 5 Comparison on Importance of Markets

Panel A: One-way ANOVA

	1997 average	2005 average	2008 average	Kruskal-Wallis test (two-tailed)	
Domestic stock market	1.4524 (n = 84)	1.3902 (n = 123)	1.4211 (n = 57)	0.6091	
Domestic bond market	1.5432 (n = 81)	1.9187 (n = 123)	1.7193 (n = 57)	0.0036	***
Overseas stock market	2.0370 (n = 81)	2.5935 (n = 123)	2.1250 (n = 56)	0.0001	***
Overseas bond market	1.7654 (n = 81)	2.5366 (n = 123)	2.1607 (n = 56)	0.0001	***

Table 5 Comparison on Importance of Markets						
Panel B: Multiple comparison (modified with Bonferroni's correction)						
	1997–2005		1997–2008		2005–2008	
Domestic bond market	0.0007	***	0.3488		0.0975	
Overseas stock market	0.0000	***	0.4294		0.0001	***
Overseas bond market	0.0000	***	0.0038	**	0.0019	***
Note: (1)*, **, and *** denote significance levels of 10%, 5%, and 1%, respectively. (2) In the 1997 questionnaire, a three-point Likert scale was used (1 = very important, 2 = important, 3= not important). The 2005 and 2008 data have been modified to be comparable with the 1997 data.						

Figure 6 Perceived Importance of Financial Statements to Users (2008)



The perceived lower importance of overseas markets may suggest that Japanese companies pay relatively little attention to overseas users of financial statements, which may create little incentive to adopt international accounting standards. To confirm this, the second question in the questionnaire used a similar five-point Likert scale (with 1 = not important at all, 3 = not so important, and 5= very important) to determine how CFOs or senior managers viewed the importance of financial statements to various users (see Figure 6).

Figure 6 shows that respondents believe financial statements to be important to most users. Generally, respondents expressed their assessment that financial statements are more important to domestic investors than to overseas investors. However, they do believe that financial statements are important even for overseas investors. For investor in the domestic stock market, 42% of respondents believe that financial statements are very important to individual investors in the stock market, while 70% believe that financial statements are very important to institutional investors. However, for investors in the overseas stock market, 60% of respondents believe that financial statements are important to institutional investors while only 26% regard them to be very important to individual investors.

Interestingly, panel B (Table 7) demonstrates that Japanese managers' views on the importance of financial statements to users changed dynamically during the ten years between 1997 and 2008. However, managers' perception that financial statements are most important to

domestic institutional investors compared with other users remained unchanged during the past decade, which is illustrated in the first line of Panel A of Table 7.

Table 7 Comparison on Perceived Importance of Financial Statements to Users

Panel A: One-way ANOVA

	1997 average	2005 average	2008 average	Kruskal-Wallis test (two-tailed)	
Domestic institutional investors: stock market	1.4217 (n = 83)	1.4146 (n = 123)	1.3333 (n = 57)	0.5823	
Domestic institutional investors: bond market	1.5125 (n = 80)	1.9512 (n = 123)	1.6964 (n = 56)	0.0012	***
Domestic individual investors: stock market	2.0000 (n = 82)	1.7073 (n = 123)	1.7018 (n = 57)	0.0023	***
Domestic individual investors: bond market	2.1250 (n = 80)	2.2049 (n = 123)	2.0714 (n = 56)	0.4613	
Overseas institutional investors: stock market	1.4578 (n = 83)	1.8293 (n = 123)	1.5789 (n = 57)	0.0023	***
Overseas institutional investors: bond market	1.5625 (n = 80)	2.2276 (n = 123)	1.8750 (n = 56)	0.0001	***
Overseas individual investors: stock market	1.9268 (n = 82)	2.1739 (n = 115)	2.1579 (n = 57)	0.0353	**
Overseas individual investors: bond market	2.0000 (n = 80)	2.4696 (n = 123)	2.3750 (n = 56)	0.0001	***

Panel B: Multiple comparison (modified with Bonferroni's correction)

	1997–2005		1997–2008		2005–2008	
Domestic institutional investors: bond market	0.0003	***	0.2771		0.0603	
Domestic individual investors: stock market	0.0012	***	0.0052	**	0.9799	
Overseas institutional investors: stock market	0.0008	***	0.5946		0.0350	
Overseas institutional investors: bond market	0.0000	***	0.0322	*	0.0097	**
Overseas individual investors: stock market	0.0132	*	0.0533		0.9335	
Overseas individual investors: bond market	0.0000	***	0.0016	***	0.4001	

Note: (1) *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.

(2) In the 1997 questionnaire, a three-point Likert scale was used (1 = very important, 2 = important, 3 = not important). The 2005 and 2008 data have been modified to be comparable with the 1997 data.

I also investigated foreign ownership of each company. Only 10% of respondents stated that they had no overseas investments, while 48% of respondents, the largest group, stated that their foreign ownership was within "1–10%," 12% of respondents chose "11%–20%," 20% of respondents chose "21%–40%," and 10% chose "over 40%."

(2) Attitude toward and opinion on the adoption of IFRS

The survey asked respondents to select one of three options on the proper approach to adopt international accounting standards. The three options were the following: (1) only adopt the IFRS or U.S. GAAP, (2) use both the IFRS (for overseas use) and Japanese GAAP (for domestic use), and (3) use international accounting standards as a supplementation to Japanese GAAP. In 2008, forty-one percent of respondents preferred to adopt only the IFRS as the basic financial statements standard and 29% of respondents preferred to use Japanese GAAP as a

supplementation to IFRS. Only 11% chose using both IFRS and Japanese GAAP, which was likely a result of the high cost of using two standards and the complication of practices.

Figure 8 shows the importance of IFRS and Japanese GAAP difference by area in 2008. It seems that the areas of "Goodwill", "Comprehensive income" are the very important differences between IFRS and Japanese GAAP. Since the 1997 questionnaire included only standards for financial instruments and foreign exchange, the comparison among 1997, 2005, and 2008 can only be performed within these two areas. The results, shown in Table 9 demonstrate that the difference between Japanese GAAP and IFRS are thought to be less important in 2008 than in 2005.

I also asked respondents to state their opinions on the change in the application of international accounting standards five years from now. Most respondents expected that the use of the IFRS would increase for both consolidated and separate parent company financial statements, and only in consolidated financial statements as well as supplementary disclosures. The minority of the respondents considered that the IFRS would be adopted only for parent company accounts. If the expectation of these respondents is correct, they will need to plan to transition to the IFRS.

Figure 8 The Importance of IFRS and Japanese GAAP Differences by Area (2008)

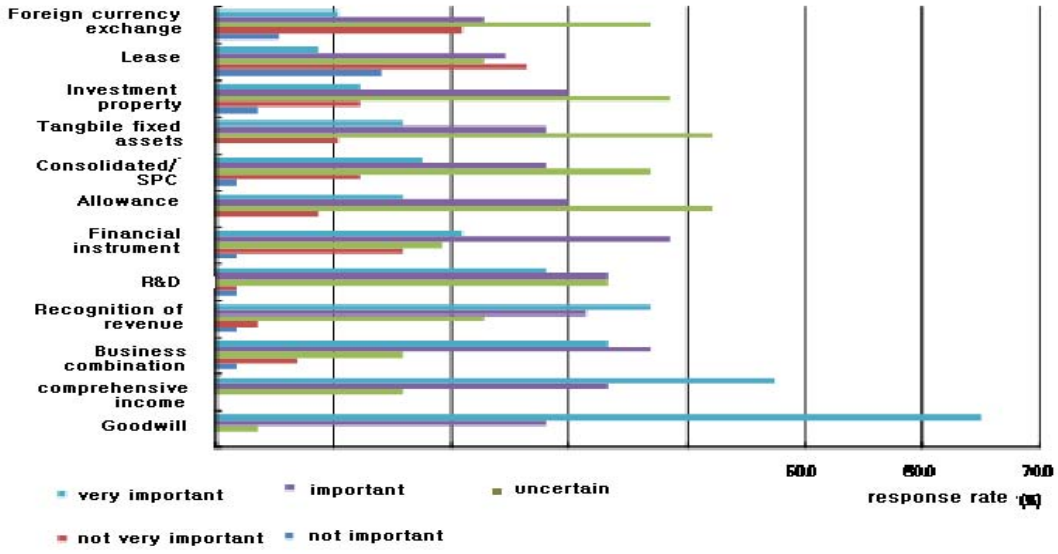


Table 9: Comparison on the Importance of IFRS versus Japanese GAAP Differences by Area					
Panel A: One-way ANOVA					
	1997 average	2005 average	2008 average	Kruskal-Wallis test (two-tailed)	
Financial instruments	1.7073 (n = 82)	2.5785 (n = 121)	2.1636 (n = 55)	0.0001	***
Foreign currency exchange	1.9500 (n = 80)	2.6116 (n = 121)	2.5455 (n = 55)	0.0001	***

Table 9: Comparison on the Importance of IFRS versus Japanese GAAP Differences by Area						
Panel B Multiple comparison (modified with Bonferroni's correction)						
	1997–2005		1997–2008		2005–2008	
Financial instrument	0.0000	***	0.0003	***	0.0003	***
Foreign currency exchange	0.0000	***	0.0000	***	0.5640	
Note : (1) *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively. (2) In the 1997 questionnaire, a three-point Likert scale was used (1 = very important, 2 = important, 3 = not important). The 2005 and 2008 data were modified to be comparable with the 1997 data.						

Table 10 Comparison on Expectations of Future Application of IFRS					
Panel A: One-way ANOVA					
	1997 average	2005 average	2008 average	Kruskal-Wallis test (two-tailed)	
(1) Application only in consolidated financial statements	1.7195 (n = 82)	2.1186 (n = 118)	1.5818 (n = 55)	0.0001	***
(2) Application only in parent company's separate financial statements	2.9494 (n = 79)	2.4661 (n = 118)	2.3208 (n = 53)	0.0011	***
(3) Application in both consolidated and parent financial statements	2.4051 (n = 79)	2.2500 (n = 120)	1.8545 (n = 55)	0.0001	***
(4) Application only in supplementary disclosure	2.3026 (n = 76)	2.1345 (n = 119)	2.4717 (n = 53)	0.0028	***
Panel B: Multiple comparison (modified with Bonferroni's correction)					
	1997–2005		1997–2008	2005–2008	
(1) Application only in consolidated financial statements	0.0000	***	0.1279	0.0000	***
(2) Application only in parent company's separate financial statements	0.0002	***	0.0001 ***	0.2777	
(3) Application in both consolidated and parent financial statements	0.1939		0.0000 ***	0.0008	***
(4) Application only in supplementary disclosure	0.3356		0.0141 **	0.0008	***
Note: (1) *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively. (2) A three-point Likert scale was used (1= considerably increase, 2= increase, 3= no change).					

As shown in Panel A of Table 10, an increase in the number of respondents with two expectations occurred from 1997 to 2008 (2.95>2.47>2.32; 2.41>2.25>1.85). The two expectations are (2) Application only in parent company's separate financial statements and (3) Application in both consolidated and parent financial statements (see Table 10). It appears that an increasing number of respondents considered adopting IFRS in a parent company's separate accounts and consolidated financial statements.

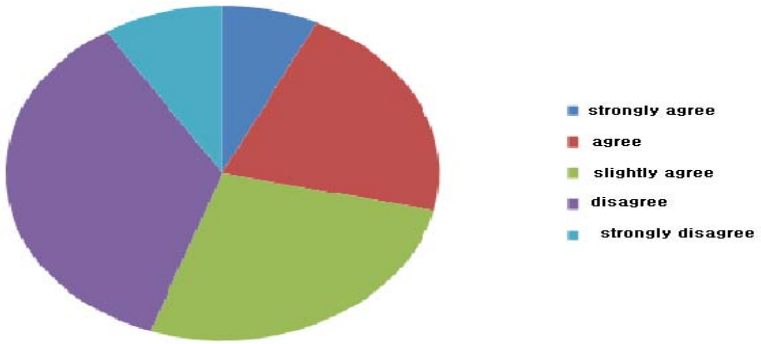
(3) The present situation on IFRS adoption or application

The survey then asked whether respondents agreed with the statement that it would be difficult to transition from Japanese GAAP to the IFRS. The Table 11 shows the results in 2008. As illustrated in Table 11, 29% of respondents believed that it would be difficult to transition from Japanese GAAP to the IFRS in 2008. Only two out of 58 usable respondents reported that

they are currently adopting the IFRS. Only two other Japanese companies responded that they planned to adopt the IFRS although they were not using it at that moment. However, the vast majority (93.1%) of the respondents noted that the IFRS was not being adopted and they were unsure whether they would adopt it in the future.

I asked respondents who indicated that they had not yet adopted the IFRS to explore the main reason for not adopting it. The reasons suggested by respondents were as follows: (1) the cost was too high (six respondents), (2) there was inadequate staff training system (14 respondents), (3) the international accounting standards are inconsistent with Japanese accounting standards (22 respondents), (4) there is little benefit in adopting international accounting standards (13 respondents), (5) adopting IFRS was not legally required (30 respondents), and (6) other (8 respondents). Multiple choices were allowed, and respondents could cite other reasons. It became clear that lack of a legal requirement was the main reason for the uncertainty in the future adoption of the IFRS.

Table 11 Difficulty of Transitioning from Japanese GAAP to IFRS (2008)



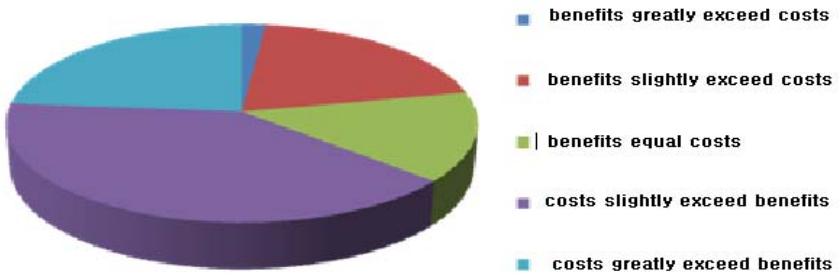
I then used the five-point Likert scale to measure respondents' perceived importance concerning the benefits of adopting IFRS. The expected benefits are as follows: (1) improve the trust and understanding of securities investors, (2) improve the trust and understanding of bond investors, (3) make it easier to issue securities in international markets, (4) reduce the cost of raising bond capital, (5) improve the international image of the company, (6) reduce the barriers to listing on overseas stock markets, and (7) reduce the cost of creating financial statements.

The majority of the respondents perceived that the most important benefits of adopting the IFRS were to "make it easier to issue securities in international markets" (61%), "improve the trust and understanding of securities investors" (58%), and "reduce the barriers to listing on overseas stock markets" (51%) in 2008. It is obvious that the greatest benefit in adopting the IFRS is related to international markets, international status, and international fundraising. Only 9% of respondents believe that "reduce the cost of making financial statements" was an important or very important factor.

Table 12 Comparison on Benefits of IFRS Adoption					
Panel A: One-way ANOVA					
	1997 average	2005 average	2008 average	Kruskal-Wallis test (two-tailed)	
(1) Improve the trust and understanding of stock investors	1.6552 (n = 29)	2.4333 (n = 120)	2.1754 (n = 57)	0.0001	***
(2) Improve the trust and understanding of bond investors	1.6207 (n = 29)	2.5167 (n = 120)	2.2105 (n = 57)	0.0001	***
(3) Make it easier to issue securities in international markets	1.7667 (n = 30)	2.1833 (n = 120)	2.0702 (n = 57)	0.0367	*
(4) Reduce the cost of raising bond capital	2.1667 (n = 30)	2.7059 (n = 119)	2.5965 (n = 57)	0.0001	***
(5) Improve the international image of the company	1.8000 (n = 30)	2.2975 (n = 121)	2.4035 (n = 57)	0.0003	***
(6) Reduce the barriers to list on overseas markets	1.9667 (n = 30)	2.2479 (n = 121)	2.1228 (n = 57)	0.1864	
(7) Reduce the cost of creating financial statements	2.6897 (n = 29)	2.9339 (n = 121)	2.8772 (n = 57)	0.0010	***
Panel B: Multiple Comparison (modified with Bonferroni's correction)					
	1997–2005		1997–2008		2005–2008	
(1) Improve the trust and understanding of stock investors	0.0000	***	0.0035	***	0.0462	
(2) Improve the trust and understanding of bond investors	0.0000	***	0.0008	***	0.0126	**
(3) Make it easier to issue securities in international markets	0.0087	***	0.1062		0.4266	
(4) Reduce the cost of raising bond capital	0.0000	***	0.0030	***	0.2821	
(5) Improve the international image of the company	0.0004	***	0.0001	***	0.4414	
(7) Reduce the cost of creating financial statements	0.0002	***	0.0276	*	0.3222	

Note: (1) *, **, and *** denote significance levels of 10%, 5%, and 1%, respectively.
(2) In the 1997 questionnaire, a three-point Likert scale was used (1 = very important, 2 = important, 3 = not important). The 2005 and 2008 data were modified to be comparable with the 1997 data.

Figure 13 Cost-benefit Analysis of IFRS Adoption (2008)



Interestingly, the perceived benefits from adopting the IFRS changed over the years. To be specific, respondents from the 2008 investigation had more negative beliefs about adopting

the IFRS and perceived fewer benefit than did respondents in 1997. For example, in 1997, Japanese managers regarded "improve the trust and understanding of stock investors" as a very important benefit, while in 2008, they did not attach great importance to it. One reason for this may be that managers after 1997 fully realized the achievement of accounting convergence toward the IFRS through the Accounting Big Bang. This trend may also be observed in the expected benefits items (1)–(5) and (7), as shown in panel B of Table 12.

Table 14 Comparison on Cost-Benefit Analysis of IFRS Adoption

Panel A: One-way ANOVA

	1997 average	2005 average	2008 average	Kruskal-Wallis test (two-tailed)	
	2.8571 (n = 28)	3.8983 (n = 118)	3.6364 (n = 55)	0.0001	***

Panel B: Multiple comparisons (modified with Bonferroni's correction)

	1997–2005		1997–2008		2005–2008	
	0.0000	***	0.0026	***	0.2203	

Note: (1) *, **, ***denote significance levels of 10%, 5%, and 1%, respectively.
(2) A five-point Likert scale was used (1= benefit is much more than cost, 3= the same,5= cost is much more than the benefit

The questionnaire then asked accounting managers to state their perception of the relationship between costs and benefits. Figure 13 illustrates the results. The respondents showed skepticism over the benefits of IFRS adoption. Indeed, 63% of respondents thought that the costs would exceed the benefits, while 15% indicate that the costs would almost equal the benefits, and only 1.8% expected that the benefits would greatly exceed the costs of IFRS adoption.

A comparison of 2008 data with 1997 data showed a stronger expectation of Japanese managers that costs would exceed benefits (see Table 14).

Furthermore, as for a principle-based approach or a rule-based approach to adopting international accounting standards, a higher number of respondents regarded a principle-based approach as more appropriate.

CONCLUSION

The present research investigated Japanese managers' attitude toward the adoption of the IFRS in Japanese companies and the changes in attitude over the past ten years after the Accounting Big Bang. By comparing 2008 data with 1997 and 2005 data, I found the following five results.

(1) Japanese companies have still been great importance to the domestic stock market after 1997 (see Figure 4 and Table 5). Interestingly, it is conflict with the globalization trend in the Japanese economy, as illustrated by an increase in local manufacturing and sales, overseas manufacturing, and exportation to third-world countries after 1997.

(2) The difference between Japanese accounting standards and the IFRS has been clearly perceived by management. This perception changes over time (Figure 8 and Table 9); in

particular, the difference in the standards for financial instruments and foreign currency exchange is regarded as insignificant, as in the past.

(3) There is growing consideration that the application of the IFRS for separate and for consolidated financial statements of parent companies should be dealt with separately (Table 10).

(4) Japanese companies have shown a negative attitude to adopting the IFRS, with the main reason being that there is no legal requirement for such adoption (Table 11). The reason why Japanese companies did not positively adopt the IFRS may be that Japanese managers expect that such an adoption would be difficult. Furthermore, with the convergence of Japanese standards and the IFRS, Japanese companies in 2008 were more confident about preparing their financial statements under domestic standards than they were in 1997. Even without adopting the IFRS, they assumed that they could gain the trust and understanding of investors (Table 12).

(5) Japanese managers expected that the costs would exceed the benefits for adoption of the IFRS. This expectation was stronger in 2008 than earlier (Figure 13 and Table 14).

Although the globalization of the Japanese economy, as demonstrated through globalized manufacturing, marketing, investing, financing (increases in foreign ownership and M&A activity), and a filtering global standard (accounting standards, corporate governance), made steady progress, Japanese companies remained prudent and passive with respect to the adoption of the IFRS. One main reason is that Japan is promoting the accounting standards convergence project. It is expected that Japanese standards will be regarded as equivalent to the IFRS when the project is completed. The accounting standards resulting from the convergence project are a kind of "reinvention" according to Roger's innovation theory (Koga and Rimmel 2007).

On the other hand, there is a continuous increase in the number of countries adopting the IFRS as their domestic standard (Hu 2005). All listed companies in the EU were required to adopt the IFRS as of 2005. Korea and Canada, after Australia, New Zealand, and South Africa, decided to adopt the IFRS as of 2011 (Yano 2008). Australia is a special case, as it experienced a two-stage approach to globalization. The initial approach, commencing in 1996, was to selectively harmonize and converge. However, Australia surprised the world's standards-setting community when its standard-setting oversight body unexpectedly announced in 2002 that it would adopt the IFRS as of 2005. Australia was long perceived as having high accounting standards. However, the country adopted globally consistent accounting standards at the risk of sacrificing some degree of high-quality financial reporting that resulted from its own national standards, as some of the Australian accounting standards are much stricter and are regarded as more relevant. The initial reaction of the Australia Accounting Standards Board and the business community was shock, then denial and anger, and then finally acceptance.

The IFRS, as an innovation of institution, is relatively new to Japanese managers familiar with domestic standards. Results of the present study indicate an important reason for managers' refusing to adopt the IFRS—they believe that the costs related to adoption would exceed the benefits. Moreover, this perception is much stronger that that shown in the 2008 investigation. In fact, the "it is not legally required" (52%) reason is more critical than the "the cost is too high"

(10%) reason. This demonstrates a passive but acceptable attitude of Japanese companies toward the adoption of the IFRS.

Whether or not I like it, the Japanese accounting environment is advancing toward globalization. Financial Services Agency of Japan demanded the Japanese companies to comply IFRS voluntarily as from 2010 (Hu 2011). With this background, the adoption of the IFRS is the expected next step after the completion of the convergence. To continue the globalization trend, constructing an accounting institution and training system based on IFRS becomes critical.

AUTHOR'S NOTE

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THE IMPLICATIONS OF GOVERNMENT'S POVERTY REDUCTION PROGRAMS ON THE STATES OF POVERTY AND HUNGER IN THE PHILIPPINES[1]

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ABSTRACT

The incidence of poverty has been a prevalent social issue in the Philippines. Poor living conditions are alarming and current measures of poverty incidence are high. Access to basic needs and assets becomes a struggle for households especially to those who belong to the lower income distribution. Even food has become a luxury for some. With income as a measure of individual welfare and the vital factor that links food consumption and poverty, as real income decreases, more households are subjected to poverty and hunger. Previous studies covered poverty statistics and its continuous revisions to capture the real state of poverty in the country which is inclusion of food distribution in poverty measures. This study aims to exposit the existence of food inequality in the Philippines, both in national and regional level. Likewise, this study will examine the source of food inequality by identifying factors through estimation of Engle Curves using the Generalized Methods of Moments (GMM). Lastly, this study will also evaluate the effectiveness of government poverty alleviation programs in addressing the state of hunger through the use of a discrete choice model employing Maximum Likelihood Estimation (MLE). This will be evaluated on a provincial level to examine the effectiveness of implemented programs in detail with regards to household characteristics. Results provide a picture on how deep food inequality go and how this should be addressed by policymakers. Also, results will provide a distinct framework for authorities in gauging how to address implementation of poverty alleviation programs.

INTRODUCTION

Poverty reduction has been a major challenge for all economies. This led development organizations to make poverty alleviation as its overarching goal as exemplified in the United Nations' Millennium Development Goals (MDG) of 2015. Addressing this problem poses a long standing struggle to the Philippines since this has been the primary target goal of past administrations. Poverty in the country has been persistent that it is sometimes regarded as the basket case of the Southeast Asian nations. According to Schelzig (2005), the Philippines has a noticeable unequal income distribution which supports the conclusion that the Filipinos in the lower distribution is highly susceptible to impoverished living conditions and depravity from

basic sustenance and necessities, leaving households vulnerable. Income shocks have debilitating effects especially to the poor, which according to Albert & Ramos (2010) drives households to engage themselves in risky strategies that sometimes have negative effects that are irreversible and eventually succumb to deeper state of poverty.

It has been determined by the International Labor Organization (ILO) as cited by Schelzig (2005) that there are five non-monetary categories that define whether people are poor namely food, water and sanitation, health, education and shelter. In 2009, according to the National Statistics Office (NSO), the share of food to total family expenditures accounts for 42.6 percent, which is a considerable portion of income allocation and signifies as one of the priorities of consumption spending. With the existing income inequality in the Philippines, this can be easily translated to food inequality through the income channel which means that families and individuals in the lower income distribution are unable to gain access to food because of the lack of ability to afford decent food consumption. This is a serious issue because according to Reyes (2001), the poorest Filipino households allocate a significant portion of their income on food. Furthermore, decreasing real income also signifies that capacity to spend on food is restricted; hence, families are forced to concentrate household expenditure on basic necessities.

The National Statistical Coordination Board (NSCB) and NSO come up with measures to assess the depth of poverty in the country. Measures such as poverty incidence, Gini coefficient, and income and expenditure ratios all relate to the traditional measure of welfare which is the level of income. The measure of welfare and poverty is not limited to income and expenditure alone. In the Philippines, there are two official measures of poverty, namely, the food threshold and the poverty threshold (Schelzig, 2005). Recent literatures on poverty and food came up with revised measures of these thresholds in order to come up with more indicative measure of poverty. A study penned by Pedro, Candelaria, Velasco & Barba (n.d.) estimated food threshold adjusted to the lower 30 percent of the income distribution to represent the poor in the population to gauge poverty incidence through food.

Having established this relationship between food and poverty incidence, this study will investigate the link of poverty and food inequality. Hence, the main research problems of this research are: Will the poverty reduction programs of the government be effective in reducing the probability of a household experiencing state of hunger? How will the government alleviate hunger through its poverty reduction programs? To address these research problems, the following specific objectives are set:

1. To estimate the Engel curve of the Philippines that will show how responsive household food consumption is to changes in various significant sources of household income; hence, will show why households have different food consumption levels;
2. To estimate a logistic regression model at the provincial level that will show whether the government's poverty reduction programs can alleviate the probability that a household will experience state of hunger; and
3. To provide policy recommendations on how to alleviate poverty through the reduction of the number of households experiencing state of hunger.

Accomplishing these objectives will determine what significant factors affect food inequality. Furthermore, it will assess the effectiveness of government poverty alleviation programs; whether these programs do address the problem on hunger and food inequality. Upon evaluation, results of this study can provide a framework to policymakers to address program implementation more efficiently and to suggest programs that can actually sustain household welfare and answer hunger problems.

POVERTY AND FOOD INEQUALITY

The State of Poverty and Food Inequality in the Philippines

The Philippines has been on a continuous pursuit of poverty alleviation. However, with the recent global financial crisis, continuous severe natural calamities, and rising fuel and food prices, the government's goal of reducing poverty is becoming more difficult since these situations have been pulling more people into poverty.

The recently released official poverty statistics from the NSCB, as seen from the Table 1, show that the annual per capita poverty threshold have increased by 26.2 percent from 2006 to 2009. Although poverty incidence among families has slightly declined from 2006 to 2009, the poverty incidence among the population has increased by 0.1 percentage point and is still relatively high compared to that of Indonesia, Malaysia, Thailand, and Vietnam as per the reports from the United Nations Development Program (UNDP).

The other three poverty measures have decreased from 2006 to 2009 implying a better condition. The income gap[2] and the poverty gap[3] have been reduced by 1.5 points and 3 points in three years, respectively. However, the poverty gap is still high compared to Indonesia, Malaysia, Thailand and Vietnam. The severity of poverty or the total of the squared income shortfall has also declined by 0.2 points in 2009. All these poverty measures have all improved, however, not significantly.

One characteristic of the country's poverty, as pointed out by Reyes, Tabuga, Mina, Asis & Datu (2010) is the glaring inequality across regions. Illustrated in Figure 1 are the thematic maps of the 2009 income gap, poverty gap, and severity of poverty where red shades show higher gaps and are therefore comparatively worse off areas that green shaded areas. The darker the red, the situation in that area is worse off compared to the rest and the darker the green shade, the better off. Provinces with higher income gaps and poverty gaps are concentrated more in Mindanao than in Luzon and Visayas. There are significantly higher poverty measures in Eastern Visayas and Caraga Administrative Region where Eastern Samar and Agusan del Sur are located, respectively, compared to that of the National Capital Region (NCR). Caraga is one of the most impoverished regions whose primary source of income is the agriculture and forestry sector similar to the Eastern Visayas. Zamboanga Peninsula is also another region stricken with more poverty especially compared with its neighbor region the Autonomous Region of Muslim Mindanao (ARMM).

The map emphasizes the reality that poverty in the Philippines is a geographical matter that calls for more programs in alleviating poverty prioritizing regions with significantly worse

conditions. As reported by the 2009 Philippine Poverty Statistics, the poverty incidence among families in NCR has improved from 3.4 in 2006 to 2.6 in 2009 but the considerably different poverty incidence among families in the ARMM has worsened from 36.5 in 2006 to 38.1 in 2009 and has been the region with most poverty incidence in 2006 and 2009.

National averages do not show the staggering urban and rural differences and also the regional variations. Regional averages also do not show provincial disparities (Schelzig, 2005). The startling provincial level differences are illustrated in Table 3. Eastern Samar and Agusan Del Sur's, poverty incidence among population is 54.0 and 58.1, respectively, both more than 20 times higher than that of NCR District IV's poverty incidence. Attention should also be paid to the fact that both provinces have worsened since 2006 in both poverty incidence among families and population when NCR District IV have significantly improved. The complete details of the measures of poverty incidence for the Philippines and its regions are shown in Table 2, Table 3, and Table 4. This just confirms that there is certainly a need to employ improved and well-designed policies that takes into account provincial and regional profile for a more strategic distribution to potential key areas for a more socially and economically equal society.

Sources of Poverty

Developing countries are characterized by having high income inequality, inequitable distribution of income, and poverty incidence (Todaro & Smith, 2006). Although the Philippines has been vigilant in addressing poverty, it has been sluggish compared to other Asian economies that have been successful in reducing their country's poverty incidence. Even Cambodia, Indonesia, Malaysia, and Vietnam whose annual real Gross Domestic Product (GDP) growth rate is lower than the Philippines, as per the reports of the UNDP, have outperformed the country in reducing poverty for the past two decades. The general literature on poverty in the Philippines cited that the main reason for the low reduction of poverty is the slow growth of the economy. With this reduced economic expansion accompanied by high population growth rate, the country suffers a slow growth rate of per capita income. However, even though the economy will experience high growth, the quality of this growth is vital since not all economic growth is in support of the poor. Furthermore, according to Aldaba (2009), since the economy fails to maintain a high level of sustained growth, it cannot create the necessary employment, therefore, inadequate income for the poor that further reduces their opportunity to fight poverty thus increasing the gap between the rich and the poor.

Another contributory factor of insistent poverty is the high level of population growth. High level of population growth may indicate increasing family size and the larger the family size is, the greater the household or family's probability of being poor (Schelzig, 2009) because, as assessed by Orbeta (2002), high fertility is related to the decline in human capital investments. An additional member of a family means an additional allocation of a usually meager income, thus lesser division of family resources (Schelzig, 2005), most particularly, food and nutrition. Moreover, the high population growth impedes economic development for two interconnected reasons. First, rapid population growth lessens per capita income, since the people, especially the poor cannot sacrifice basic commodities, their savings are reduced and so will be the resource for

investment in productive capacity. This will sequentially decrease overall economic growth and increase poverty (Schelzig, 2005). Second, the country's large population that is continuously growing exceeds the capacity of the industry to absorb new labor. Since, there is a rapid increase in the labor force, and again, with the lack of quality employment, the outcome will be more unemployed individuals negatively affecting the development of the economy. This insufficient generation of employment and low quality of employment is another reason for the persistent high poverty incidence. The availability of employment cannot keep up with the growth pace of the labor force. In a matter of a decade, the country's labor force has increased by more than 50 percent and even the total labor force participation increased due to the higher participation of women in the labor force. Even with many Filipinos opting to work overseas, according to Aldaba (2009), unemployment rates are still high.

In 2010, according to NSO, the share of employment in agriculture to the total employment is 33 percent and most of the profiles of employees working in this sector including the industry sectors are considered poor. The Annual Poverty Indicator Survey (APIS) of the NSO, using the bottom 40 percent income range as a proxy for the poor, revealed that more than half of the poor are employed in agriculture in 2009 and are usually laborers and farmers (Schelzig, 2005). However, the agricultural sector that has been overlooked and has not been given proper management is lacking sustainable and quality employment (Aldaba, 2009). As argued by Schelzig (2005), the link between poverty and employment is principally apparent, not in the unemployment, but in the quality of the employment since the poor are generally working in jobs with low income and low productivity. Thus, even though the poor are employed, they are not working in a quality environment. Furthermore, rural areas where most of the poor are rely on the agricultural sector. Very little were done to strengthen, develop, and reduce or eradicate market distortions of this sector. According to Aldaba (2009), there has been less interest in advancing agricultural productivity and less concern in developing the necessary infrastructure to increase productivity further decreasing the income opportunities especially for poor in the rural areas.

Another contributory factor is the high and persistent levels of economic inequality such as income, welfare and asset inequality that diminishes the positive effect of economic growth. A study by Deininger & Squire (1998) argued that a country's initial land distribution has an effect on the succeeding expansion of its economy and performance of human development. If an economy has a high land inequality initially, it is likely that it will exhibit a lower income growth rate in the long-term and slower rate of alleviating poverty than an economy with more equitable land distribution initially. Land inequitable distribution has been the country's problem for over four decades.

There is also a high income inequality in the Philippines. In 2006, NSCB reported that the income share of the bottom 10 percent of the country's population is at 1.86. The Gini coefficient in 2006 is 45.8. Based on the statistics from the UNDP, although the unequal distribution has improved from the 46.8 in 1991 and the extent of the unequal distribution of income is better than that of Malaysia (46.2 in 2009), Thailand (53.6 in 2009) and Singapore (47.8 in 2009), it is still very high. Furthermore, Cambodia (est. 44.4 in 2007), Indonesia (36.8 in 2009), Laos (36.7 in 2008) and Vietnam (37.6 in 2008) fared better in the distribution of income.

As emphasized, poverty in the country is a geographical matter since there is a wide disparity in the standards of living and human development in the different regions. This interregional and intra-regional inequality also contributes in the persistence of poverty. According to Balisacan (2003) and Aldaba (2009), intra-regional inequality contributes 82 percent of overall inequality; thus, poverty, implying that government policies should improve distribution within the regions.

Sources of Food Inequality

The increases in global food and energy prices are contributing to the problem of poverty and food inequality. More people now are being pushed further below the poverty line that results to the lack of and unequal access to food. Lower-income households are responding to these increases in prices by further sacrificing the quantity and quality of food they consume. These households belonging in the first decile or the lowest-income household group are the most affected to increases in global food prices since, as shown in the households' consumption structure using a 2000 social accounting matrix constructed by Cororaton & Corong (2009), they allocate almost half of their consumption expenditure in agricultural and food products. Furthermore, the allocation on these commodities drops significantly if moved to the higher deciles where they shift their consumption to services (Cororaton & Corong, 2009).

Food security is a challenge confronting countries in the Asia-Pacific. Countries like Bangladesh are faced with food deficit problems since the country, lacking the adequate agriculture, has to import basic food commodities while Cambodia and Philippines are faced with food inequality. Both countries have the resources to produce sufficient food for the population yet it is divided unequally. Another case of food inequality is the unequal distribution of profits from exports to those that contributed to the production especially to manual laborers (World Vision, n.d.).

Recognizing the different sources of food inequality will assist in identifying possible targets or channels of policy recommendations. Nevertheless, the sources of food inequality are similar with the sources of poverty incidence but with more emphasis on the persistent stagnation and disregard to the agricultural sector since literature ascertains and recommends that developing the agricultural sector will increase food security. As proposed by Adelman & Morris (1967), in managing problems of food security, the sustainable approach is to increase food production through encouraging and supporting investment in agriculture to enhance food supply. Developing the agricultural sector is vital in supporting national economic growth and pro-poor growth that will help reduce poverty incidence since most poor are employed in the agricultural sector. By improving agriculture, food security will also improve since there is an increase in the access to food and income of poor farmers. This will then lead to their household's better nutrition and higher productivity (Yu, You & Fan, 2009).

Moreover, one approach in developing the agricultural sector in case of the Philippines is increasing rice productivity. Based on rice productivity simulation results by Cororaton & Corong (2009), there is an increase in the domestic production and decrease in the importation of rice if rice productivity is improved, therefore, lowering consumer prices. Another result of the

study is that it is a pro-poor solution for food inequality since it will mostly be advantageous to households in the population's first decile. This is the case because, relative to the remainder of the population, a substantial share in their consumption basket is rice (Cororaton & Corong, 2009).

Government Programs to Alleviate Poverty

Since the Aquino Administration in the 1990s, there had been specific projects targeted for poverty reduction. The Social Reform Agenda (SRA) by the Ramos administration focused on poverty alleviation and rural development. The concentration was principally on disadvantaged economic and social groups. This set the foundation for the Social Reform and Poverty Act of 1997 (Republic Act [RA] 8425) that established the National Anti-Poverty Commission (NAPC) that acts as a coordinating and advisory body in programs of social reform and poverty alleviation. It also institutionalizes the "basic sectors" and non-government organizations' participation, support local government units in incorporating SRA, and encourage micro-finance programs and institutions. One recent program launched in 2001 under the supervision of NAPC is the *Kapit-Bisig Laban sa Kahirapan* (KALAHI) program. There are five special projects in the KALAHI program; the rural projects, urban projects, social initiative projects, resettlement areas and in conflict areas.

There are many issues regarding the government's poverty reduction programs basically categorized into policy issues, institutional issues, and resource issues. Under policy issues, every administration is inclined to introduce new programs, usually without concern to what is in progress that was established by preceding administrations. Even successful programs were not continued since they were part of previous presidents' agendas. This results to redundancies in plans, frameworks and targets, and waste of energies and limited resources. Targeting mechanisms were also diverse, inefficient and highly politicized that lead to weak implementation. It also led to inclusion/exclusion of intended beneficiaries and significant leakages to unintended beneficiaries of the programs. Institutional issues, on the other hand, include transitional problems, highly politicized programs and political appointment of agency heads and the representation of the "basic sector" political matters often succeed even from the choice of representatives for the "basic sector", target beneficiaries and the allocation of the budget. The government response for resource issues is that a Poverty Alleviation Fund (PAF) was established in 1998 so that funds for poverty reduction will always be a part of the national budget (Schelzig, 2005)

Government Programs to Alleviate Food Inequality

The Philippine government recognized the importance of rice productivity to the agricultural sector, therefore, introduced the hybrid rice technology to increase rice productivity. In 2002, the government launched the Hybrid Rice Commercialization Program (HRCP) that promoted the production of hybrid rice seeds and encouraged their continued use by farmers by ensuring that seeds are bought at a guaranteed price, that the distribution of the seeds to

participating farmers are offered at half the procurement price and the government provided assistance by allocate money to participating farmers to compensate additional input costs. The government has even provided help by offering credit and installment payment schemes. The implementation of this program was, however, inefficient, and ineffective. The reception of hybrid rice was not encouraging. Participating farmers have opted to discontinue their use of hybrid rice since it is expensive and has to be acquired every planting season. The subsidies offered by the government have also influenced farmers' decisions between hybrid and inbred rice varieties without proper information (Cororaton & Corong, 2009).

The Link between Food Inequality and Poverty in the Philippines

Poverty causes inability to afford food and food consumption is used to measure poverty. The difference between poverty incidences among municipalities and regions will therefore lead to unequal distribution of food among regions and even among the population in a particular region. However, the transmission mechanisms between the two variables vary. A basic and the most explicit relationship between food and poverty are through consumption and income measures. A study conducted by Llanto (1996), delved on the reaction of Philippine households, focusing more on rural and agricultural households, to income and price changes. The motivation for such consideration is due to the belief that households in the lower strata is more affected when there are shocks affecting commodity prices and level of income. Llanto (1996) also highlighted that factors that cause food prices to increase has jeopardizing effects on small farm households hence, sharing the view that "small households spend a relatively large portion of their income on food, and thus, any increase in the price of food products is likely to hurt them more than the richer households". The research also investigated income and price elasticities with regards to region, income class and location to strengthen the stand of low income and rural households are at lose when food prices increase and level of household income decreases. The study was able to pinpoint that rural households are price inelastic to staples such as cereals, fruits and vegetables since these are easily accessed by these types of household and are not substitutable.

The measure of poverty is not stagnant. It should not be constricted to the lack of income. Its meaning evolves accordingly; from the traditional measure of income as a gauge of individual welfare towards to deprivation of basic capabilities as stated by Sen (1979). Moreover, as the Schelzig (2005) claimed, "poverty is recognized to be a dynamic, complex phenomenon involving concepts such as vulnerability and powerlessness." Furthermore, it is a deprivation of access to other assets that is important for standard living. It is essential to take note of these changes so as to fully represent the state and characteristics of poverty. As discussed by Albert & Molano (2009), in developing countries, poverty lines estimated are absolute poverty lines which are based on a fixed standard of welfare which is adjusted with regards to price changes. In the Philippines, the estimated poverty line is a representation of income needed to satisfy the minimal needs of a household, both food and non-food. The food aspect is usually referred to as the Food Poverty Line (FPL) which utilizes one-day-menus that meets the required daily dietary needs and nominally valued at the least possible price. On the other hand, the study of Pedro,

Candelaria, Velasco & Barba (n.d.) estimated food threshold and poverty incidence using the food baskets across income groups. This is a comparative study between the estimated poverty incidence and food threshold between all income groups versus the bottom 30 percent of the income group. It showed that food basket of the higher income group consists of food and other commodities that are more complex and expensive as compared to the lower 30 percent of the distribution.

FRAMEWORK OF THE STUDY

Generalized Method of Moments (GMM) in Estimating the Engel Curve

In order to determine how responsive household food consumption is to various significant sources of household income, this study will estimate the Engel curve of the Philippines. According to Besanko & Braeutigam (2002) and Chai & Moneta (2010a), an Engel curve relates the amount of a commodity purchased to the level of income, holding constant the prices of all goods. Moreover, according to Chai & Moneta (2010a), there are two varieties of Engel Curves namely the budget share Engel curves, which describe how the proportion of household income spent on a good varies with income. Alternatively, Engel curves can also describe how real expenditure varies with household income (Chai & Moneta, 2010a). Using the concept of Engel curves, this study will also be able to verify whether Filipino households conform to the best-known single result from the article is Engel's law stating that the poorer a family is, the larger the budget share it spends on nourishment.

To estimate the Engel curve, the 2007 APIS will also be used following the general functional form given by Equation 1.

$$FC_i = f(\mathbf{y}) + \varepsilon_i \tag{1}$$

Where:

FC_i is the total food consumption of household i

$\mathbf{y}$ is a vector composed of various sources of household income including other receipts (henceforth, income) i

ε_i is the error term that captures all other variables that were not included in the equation

It is hypothesized by this study that the source of inequality in food distribution is the inequality in the source of income. Hence, to determine the source of inequality in food consumption, the various sources of household income that influences food consumption must be identified. This will pinpoint why there are households who consumes more than the others. Likewise, this will have policy implications on how household income can be augmented through various government-sponsored projects targeted towards poverty alleviation. As such, Equation 1 can be rewritten as in Equation 2.

$$FC_i = \beta_0 + \beta_1 RENT_i + \beta_2 WAGES_i + \beta_3 AGR\ I_i + \beta_4 INDSTRY_i + \beta_5 SRVCS_i\ {}_6 OTHR_i + \beta_7 CONAB_i + \beta_8 INTRST_i + \beta_9 DIV_i + \beta_{10} GAMB_i + \varepsilon_i \tag{2}$$

Where:

FC_i is the total food consumption of household i.
$RENT_i$ is the income of household i from rental of non-agricultural lands
$WAGES_i$ is the income of household i from salaries and wages
$AGRI_i$ is the income of household i from agricultural activities
$INDSTRY_i$ is the income of household i from industrial activities
$SRVCS_i$ is the income of household i from services activities
$OTHR_i$ are other income not elsewhere classified
$CONAB_i$ is the cash receipts, support, etc. of household i from abroad
$INTRST_i$ is the income of household i from interest-earning activities
DIV_i is the income of household i from dividends
$GAMB_i$ is the net winnings of household i from gambling
ε_i is the error term that captures all other variables that were not included in the equation

As an a-priori expectation, all income variables must have a positive relationship with food consumption by the concept of income effect. Besanko & Braeutigam (2002) defined the income effect as the change in the amount of good or service that a consumer would buy as purchasing power changes, holding all prices constant. However, the shapes of Engel curves depend on many demographic variables and other consumer characteristics. An Engel curve reflects its income elasticity and indicates whether the good is an inferior, normal, or luxury good. Empirical Engel curves are close to linear for some goods, and highly nonlinear for others. According to Besanko & Braeutigam (2002), for normal goods, the Engel curve has a positive gradient wherein as income increases, the quantity demanded increases. Amongst normal goods, there are two possibilities. Although the Engel curve remains upward sloping in both cases, it bends toward the *y*-axis for necessities and towards the *x*-axis for luxury goods. Meanwhile, Besanko & Braeutigam (2002) furthered that for inferior goods, the Engel curve has a negative gradient wherein as the consumer has more income, they will buy less of the inferior good because they are able to purchase better goods. On the other hand, for goods with Marshallian demand function generated from a utility function of Gorman polar form, the Engel curve has a constant slope. Similarly, most Engel Curves feature saturation properties in that their slope tends to diminish at high income levels, which suggests that there exists an absolute limit on how much expenditure on a good will rise as household income increases (Chai & Moneta, 2010b). This saturation property has been linked to slowdowns in the growth of demand for some sectors in the economy, causing major changes in an economy's sectoral composition (Pasinetti, 1981).

The Engle curve presented by Equation 2 faces the problem of endogeneity wherein there is correlation between a parameter or variable and the error term (Gujarati & Porter, 2009). Endogeneity can arise as a result of measurement error, autoregression with autocorrelated errors, simultaneity, omitted variables, and sample selection errors (Gujarati & Porter, 2009). It is suspected that the income per se is endogeneous with respect to educational attainment based on Mincer (1974) wherein income distribution is related to age as well as varying amounts of education and on-the-job training among workers. To address the problem of endogeneity, this study will attempt to provide structural equations that will explain the movement of the various

sources of income. Hence, the data that will enter Equation 2 will be predicted values of the separate regression of the various sources of income against educational attainment grounded on the framework of Mincer (1974).

Aside from endogeneity, heteroscedasticity also plagues estimation of Engel curves wherein as income increases, the difference between actual observation and the estimated expenditure level tends to increase dramatically; consequently, the Engel curve and other demand function models fail to explain most of the observed variation in individual consumption behavior (Lewbel, 2007). As result, many scholars acknowledge that influences other than current prices and current total expenditure must be systematically modeled if even the broad pattern of demand is to be explained in a theoretically coherent and empirically robust way (Deaton & Muellbauer, 1980). For instance, some success has been achieved in understanding how social status concerns have influenced household expenditure on highly visible goods (Charles, Hurst & Roussanov, 2009; Heffetz, n.d.).

The problem of heteroscedasticity in estimating Engel curves is even worsened by the fact that this study is utilizing the 2007 APIS to generate empirical results, which is a cross-sectional data. According to Gujarati & Porter (2009), heteroscedasticity is defined as differing variance. Moreover, Gujarati & Porter (2009) emphasized that heteroscedasticity does not cause ordinary least squares (OLS) coefficient estimates to be biased, although it can cause OLS estimates of the variance of the coefficients to be biased, possibly above or below the population variance. Therefore, regression analysis using heteroscedastic data will still provide an unbiased estimate for the relationship between the exogenoeus and endogeneorus variables. However, standard errors and inferences obtained from data analysis are spurious. Consequently, biased standard errors lead to biased inference, so results of hypothesis tests might be wrong.

The 2007 APIS will be subjected to the Generalized Method of Moments (GMM) estimation methodology to analyze the statistical significance of the various sources of household income on food consumption. Since the dataset is cross-sectional, it is plagued by the problem of heteroscedasticity (Gujarati & Porter, 2009). According to Baum, Schaffer, & Stillman (2003), the usual approach today when facing heteroscedasticity of unknown form is to use the GMM introduced by Hansen (1982), which makes use of the orthogonality conditions to allow for efficient estimation in the presence of heteroscedasticity of unknown form. Also, many standard estimators, including the Instrumental Variable (IV) and Ordinary Least Squares (OLS) are deemed as special cases of GMM estimators. Hence, in the presence of heteroscedasticity, the GMM estimator is more efficient (Baum, Schaffer, & Stillman, 2003).

Another reason why the GMM estimation technique was preferred is because of its robustness to differences in the specification of the data generating process (DGP) and it also automatically addresses endogeneity. According to Greene (2003), under the GMM, a sample mean or variance estimates its population counterpart regardless of the underlying process. GMM provides this freedom from unnecessary distributional assumptions, such as the normality assumption under OLS that has made this method appealing. However, it must be noted that this comes at a cost because if more is known about the DGP such as its specific distribution, then the method of moments may not make use of all of the available information. Hence, the natural estimators of the parameters of the distribution based on the sample mean and variance becomes

inefficient. Thus, the method of maximum likelihood estimation (MLE) is the alternative approach which utilizes this out of sample information and provides more efficient estimates (Greene, 2003).

Maximum Likelihood Estimation (MLE) in Assessing Government's Poverty Reduction Programs in Pasay, Eastern Samar, and Agusan Del Sur

The Engel curve estimated will explain the behaviour of households with respect to their food consumption subject to their income sources implying that food inequality is due to income inequality. However, these methodologies just show the existence of the issue on a more detailed manner. It does not empirically show how food inequality can be addressed specifically by the government. As such, another methodology must be implemented. To determine whether the government's poverty reduction programs can alleviate food inequality, there is a need to assess if existing programs can reduce the state of hunger – a proxy for food inequality because the fact that households cannot have regular access to food, it implies inequality in the distribution of food. Unfortunately, the 2007 APIS cannot capture the incidence of the state of hunger. Note that the state of hunger is defined by the Community Based Monitoring System (CBMS) survey as an indicator whether a household experienced insufficient food supplies for the past 3 months. This study is arguing that experiencing insufficient food supplies can be attributed to the inequality in food distribution.

In order to determine whether the government's poverty reduction programs can alleviate the probability that a household will experience state of hunger, the CBMS survey will be utilized since it possesses variables measuring the availability and effectiveness of these programs. Specifically, this study will look into the data of Pasay City in 2005, Eastern Samar in 2005, and Agusan Del Sur in 2006. The profiles of these provinces mentioned in earlier will provide additional reasons why the results of the regression are such. Likewise, these provinces were selected to capture the entire Philippine behavior with ample representatives from Luzon, Visayas, and Mindanao. The logistic specification of the variables influencing the probability that the household experienced state of hunger is given by Equation 4.

To reinforce the effect of educational attainment to state of hunger, this study opted to use the direct relationship of education to income and income to state of hunger. Since as explained, those who are able to acquire high educational attainment are the individuals who have access to higher level of income and therefore are the ones who decrease the likelihood to experience hunger. This procedure will utilize the OLS regression as shown by Equation 5. Afterwards, the predicted value of household income will be then substituted in Equation 4 as the representation of income influencing the probability of household hunger. In this regard, the procedure exemplify that income is the channel of education in affecting states of hunger and poverty.

$$\ln\left(\frac{p_i}{1-p_i}\right) = f(FSIZE_i, HHINCOME_i, ESTATHH_i, HEALTH_i, FEEDING_i, SCHOLAR_i, SKILLS_i, HOUSING_i, CREDIT_i) + \varepsilon_i \quad (4)$$

$$HHINCOME_i = \alpha_0 + \alpha_1 ELEMGRAD_i + \alpha_2 HSUNDR_i + \alpha_3 HSGRAD_i + \alpha_4 PSUNDR_i + \alpha_5 PSGRAD_i + \alpha_6 COLUNDR_i + \alpha_7 COLGRAD_i + \alpha_8 WMSPHD_i + \nu_i \quad (5)$$

Where

p_i is the probability that a household has experienced state of hunger while $(1 - p_i)$ is the probability that a household has not experienced state of hunger. This is an indicator whether there are abnormalities in a household's access to food evidencing the food inequality being argued by this study.

$FSIZE_i$ is the number of members in household *i*. This is expected to have a positive impact on the probability that a household will experience state of hunger because more members will have to share a finite amount of food a household was able to acquire. The statistical significance of this variable will indicate whether a population policy is necessary to address food inequality.

$HHINCOME_i$ measures total household income in logarithmic form. It is the summation of all sources of household income from domestic and international sources. By a-priori, the higher the income of the household is, the lower is the probability of experiencing hunger.

$ESTATHH_i$ is a vector of employment status of the household head, which includes $PERMANENT_i$ and $SEASONAL_i$ which are dummy variables indicating whether the household head is employed permanently or seasonally. The temporarily employed category was dropped to avoid perfect multicollinearity and dummy variable trap. Categories assume a value of 1 if the household head is permanent and seasonal, 0 otherwise. By a-priori, having permanent employment reduces the probability of state of hunger because of the stable flow of income to finance food consumption. Meanwhile, having seasonal or temporary employment might increase the probability of state of hunger in the household because of the impermanent flow of income that will result also to ephemeral food consumption.

$ELEMGRAD_i$, $HSUNDR_i$, $HSGRAD_i$, $PSUNDR_i$, $PSGRAD_i$, $COLUNDR_i$, $COLGRAD_i$, and $WMSPHD_i$are dummy variables indicating whether the household head is an elementary graduate, high school undergraduate, high school graduate, post secondary undergraduate, post secondary graduate, college undergraduate, college graduate, and with graduate studies respectively. The category elementary undergraduate was dropped to avoid the dummy variable trap. By a-priori, the higher the educational attainment of the household head is, the better opportunities await the household head in participating in lucrative job opportunities that will provide for ample food consumption.

$HEALTH_i$, is a dummy variable indicating whether a household received or availed of health assistance programs such as free eye check-up, dental services, and others during the past 12 months. It assumes a value of 1 if the household received or availed of this program and 0 otherwise.

$FEEDING_i$ is a dummy variable indicating whether a household received or availed of supplemental feeding program for the past 12 months. It assumes a value of 1 if the household received or availed of this program and 0 otherwise.

$SCHOLAR_i$is a dummy variable indicating whether a household received or availed of education and scholarship program for the past 12 months. It assumes a value of 1 if the household received or availed of this program and 0 otherwise.

$SKILLS_i$ is a dummy variable indicating whether a household received or availed of skills or livelihood programs for the past 12 months. It assumes a value of 1 if the household received or availed of this program and 0 otherwise.

$HOUSING_i$ is a dummy variable indicating whether a household received or availed of housing program for the past 12 months. It assumes a value of 1 if the household received or availed of this program and 0 otherwise.

$CREDIT_i$ is a dummy variable indicating whether a household received or availed of credit program for the past 12 months. It assumes a value of 1 if the household received or availed of this program and 0 otherwise.

ε_i and v_i are the respective error terms that captures all other variables that were not included in the equation.

These variables represent the provision of government subsidies that will augment incapacity of households to acquire decent and sufficient amount of food. It is expected that these variables will have various impacts on the probability that a household will experience state of hunger. Intuitively, government funded health, scholarship, and credit programs are expected to decrease the likelihood of a household experiencing state of hunger. This might be due to how such provisions shift a portion of the burden of financing food consumption, thus effectively decreasing the perceived and actual costs of purchasing food. On the other hand, assuming that food per se is a normal good, regardless of the source of income, food consumption will increase as income increases by virtue of Engel aggregation or simply income effect (Besanko & Braeutigam, 2002).

Generally assessing the effectiveness of government programs to alleviate hunger and poverty will allow for the creation of alternative policies that will directly address hunger, food inequality, and eventually poverty.

RESULTS AND DISCUSSION

In order to address the first research objective, the Engel curve for the Philippines was estimated using GMM and results, found on Table 5, show that based on a-priori expectations, an increase in income from any source will increase food expenditure. Therefore, when households have extra income from engaging in entrepreneurial activities, there is also an increase in their total food expenditure. It just shows that food is a normal good and that by income effect, food expenditures will increase with an increase in purchasing power. Among the three major business activities where households engage in, an additional income in engaging in industrial activities has the largest marginal effect to food expenditure. An extra income from engaging in entrepreneurial activities in agriculture also has greater effect than an extra income from that of the services activities. Households that have income from renting spend most of their income in food consumption. Income from dividends and net winnings from gambling do not have any

effect on food consumption possibly attributable to the few households that engage in such activities and that they do not rely on these for their food expenditure but more on spending it on other goods or services.

Likewise, as seen on Table 6, as with any other normal good, food consumption is income inelastic so any changes in income, food consumption is unresponsive as seen on the elasticity of the different variables to food. Thus, any increase in income will have an increase in the expenditure allocated to food as shown on Table 5. Another implication is that the sources of income and receipts are not close substitutes. When a household head is dismissed from the only source of income, which is work; the individual cannot immediately and easily shift and start engaging in entrepreneurial activities. Moreover, even though the household have other resources from business profits, dividends, rental income, or interest and so on, the household cannot easily replace the income lost due to, say, the unemployment.

Most households' major source of income is from employment explaining food expenditure's less unresponsiveness to changes in income from salaries and wages relative to other sources of income. Among the three major industries, households' food expenditure is the most sensitive to changes in income from agricultural activities. This confirms the importance of the agricultural sector in the Philippines wherein 51 percent of the sample engages in agricultural activities and most poor households' major source of food consumption are from agricultural activities. This implies that events and policies that affect percentage changes in income from these will have the greatest effect in food consumption relative to that of industrial and services activities (i.e. transportation, wholesale and retail, other community services). Households' food consumption is less sensitive to income from industrial activities relative to that of agricultural and services activities. Households engaging in industrial activities have fewer alternatives compared to that of services and agricultural activities. This may also be attributable to the fact that engaging in industrial activities requires larger capital and are riskier than engaging in agricultural and services activities. Therefore, households that have industrial businesses may be richer relative to the other two. Although additional income from interest has one of the highest effects on additional food expenditure, food expenditure is most unresponsive to interest income possibly because few households keep interest earning assets and when they have such assets, they do not heavily rely on these for their food expenditure.

As mentioned above, even though households that have rental income allocate more of their income on food expenditure, food expenditure is less sensitive to changes in rental income. This is most likely for the reason that more than 90 percent of these households engage in other entrepreneurial activities. The additional support from abroad contributes to an increase in food expenditures although less sensitive. This is possibly because cash support from abroad is usually spent on other basic commodities other than food such as education and utilities.

Table 7 reports selected descriptive statistics. Compared to other independent variables, income at level reports an abnormally high mean, standard deviation and skewness. This can result to deflated estimate of standard error and wide confidence intervals which leads to poor estimates. The researchers opted to transform income to its logarithmic form in order to contain the high variability and also inhibit high variability in influencing the estimation.

Table 8 shows the results of OLS regression of household income. As expected, there is a high positive and significant relationship between education and income. Furthermore, as observed in Pasay and Agusan Del Sur, as the tier of educational attainment increases, its marginal effect on income also increases. Compared to Eastern Samar, college undergraduates and college graduates are the only estimates that have a significant contribution to income. This may be due to the rural status of the region wherein college attainment is deemed as the only beneficial factor in acquiring the most lucrative jobs in the locality. In addition, those in Eastern Samar who obtained graduate studies does not contribute a significant increase in income since, yet again, this may be due to the fact that Eastern Samar is a rural area and jobs requiring such credential is not found in the locality and/or if ever there is a position, the compensation cannot suffice the bargained salary. As compared to the marginal contribution of those who possess graduate studies in Pasay and Agusan Del Sur, these coefficients are highly significant therefore giving incentives to those who have graduate degrees in attaining higher income. This is also expected because both Pasay and Agusan Del Sur are urban and partially urban areas respectively; hence, they share a common characteristic in terms of influence of educational attainment to household income.

As seen from the results of the marginal effects after logit shown in Table 9, only selected variables have significant impact on the incidence of hunger in Pasay namely household size, household income, permanent employment, and seasonal employment. The marginal effects are true to its effect on state of hunger. It should also be noted that none of the government programs have significant marginal effect on state of hunger. There are advocacies and programs that address social concerns but the results show that none of which are able to address state of hunger effectively.

In the case of Eastern Samar, job status is the only significant factor that affects state of hunger. Permanent employment has the greatest marginal effect since permanency in job status assures income and of course, it assures accessibility to food. Again, government programs have no effect on addressing state of hunger because all coefficients representing government programs are insignificant. This may be due to the provincial state of Eastern Samar wherein government program implementation is not as effective as the implementation in urban areas. This can be due to the mountainous and dense tropical vegetation topography of the area making transportation from one point to another an issue for program dissemination especially to those who are located in isolated areas. As reported in the CBMS Status Report on MDGs for Eastern Samar in 2010, the province is still experiencing poverty issues and most of the families are still under the food threshold. The results of the regression are parallel with the current needs of the province because supply of sustainable living, provision of basic necessities, endemic diseases such as dengue, better and quality educational facilities and technology expansion are some of the challenges posed to the authorities of Eastern Samar.

Meanwhile, the results from Agusan Del Sur reported high significance in all variables except for the provision of feeding programs, which is the representation of food related programs of the government. This may be due to the existing strong agricultural upbringing of the region. Feeding programs are not as effective as it should be because households can easily access food via their own food supply since they are exposed to farming and other agricultural

activities. Likewise, as expected household size, household income, permanent employment, seasonal employment, housing programs, and credit programs are significant and affect the state of hunger in accordance to a-priori expectations mentioned earlier. On the other hand, the provision of health programs, scholarships, and training are counter-intuitive but highly significant.

Health programs in Agusan Del Sur are highly reinforced and supported. There are substantial decreases in crude death rate, prevalence of malnutrition, maternal mortality rate, etc. as reported in the CBMS Status Report on MDGs for Agusan Del Sur in 2010. Hence, death statistics in Agusan Del Sur are not alarming due to beneficial and effective contribution of health programs implemented. This grants families more financial freedom and flexibility which allows them to accommodate larger family size. This is notable in the descriptive statistics reported in Table 7 wherein the average family size in Agusan Del Sur is 6 members as compared to the 4 members of Pasay and Eastern Samar. This increase in family size then will make the household susceptible to hunger.

This can also be the case of positive marginal effects for the variables provision of scholarship and training. Wherein these programs assure lower cost for the family to sustain living, they misinterpret this financial flexibility as a way to accommodate a larger family size. This may be due to the fact that the programs implemented cushions family from rising costs of education and at the same time provide them with benefits, such as trainings for livelihood, to shed aid in their daily expenses. Hence, with the simple case of free-rider problem which encourages household to increase family size, thus, submitting the household to greater possibility of being in the state of hunger.

CONCLUSIONS AND POLICY RECOMMENDATIONS

Living in urban areas does not assure good living conditions. Urban areas and cities might pose the illusion of offering various job opportunities but this does not entail that one can pose the illusion of offering various job opportunities but this does not entail that one can escape poverty and food shortage. Prevalence of poverty has been thoroughly present throughout history and its elimination has been one of the major key goals of past and present administrations. Still, there exists poverty and food inequality in the country.

Results have shown that the differing responsiveness of various significant sources of household income against food expenditure show the different sensitivity of food consumption to the different sources of income. This may explain why households may have different food consumption levels. Moreover, food consumption is most responsive to changes in salaries and wages of households compared to any other sources of income. This shows the importance of addressing unemployment in the Philippines since households rely more on their salaries and wages than in any other source. Among the three major entrepreneurial activities, food consumption is most sensitive to income from agricultural activities proving the significance of the agricultural sector. This does not recommend that the country should remain to be structurally agricultural; however, it should be taken note that many households food consumption may be affected if there were sudden incidents that will decrease income from that

sector. The households' level of food consumption is least responsive to changes in income from interest and from abroad denoting that although food consumption increases, these incomes are usually spent on other basic commodities.

This study also found it imperative for the estimation of a logistic regression that will show, on a provincial level, whether government programs in alleviating state of hunger in selected provinces and cities that represent Luzon, Visayas, and Mindanao are effective. Results have shown that government programs are ineffective in Pasay and Eastern Samar while only feeding programs are not operational in Agusan Del Sur. This shows that government program implementation is not effective and does not influence the intended population. Furthermore, factors like regional topology hinder implementation because this defers authorities in reaching those in isolated areas which are the ones who require most of the government assistance. For the case of Agusan Del Sur, some of the government programs are positively influencing state of hunger. This is due to the after effects of effective program implementation where the programs cushion expenditures that leaves household with financial flexibility, thus, allowing them to accommodate larger family size. Hence, a simple case of free rider problem exists.

However, these results do not suggest that the government should stop promoting anti-poverty programs. Food inequality, the states of hunger and poverty is prevalent and it should be one of the prime goals of each Administration to reduce its severity. Programs addressing food shortages and poverty should be reinforced especially in areas where help from the authorities are very limited or close to none. Government agencies should implement more committed programs wherein the scope reaches the most isolated households. It is easy to ignore a few households and conveniently administer programs in populous places because they are located in far areas. On the other hand, it should be noted that these households are the ones in need. Authorities could efficiently assign *barangays* so that the scope is minimal yet it effectively reaches small communities.

Feeding programs are needed to instantaneously answer hunger. However, there is a need to call for a sustainable food production and distribution in the country. It will not only influence food supply, it will also enhance work supply in the country considering the Philippines is an agricultural reliant nation. The government could consider in establishing a more self-sufficient Philippines in terms of food production and distribution. Another plausible solution in addressing the effectiveness of government programs is through the continuous implementation of food distribution projects such as conditional food and cash grants in order to avoid the incidence of free riding. However, the government must specifically identify who must benefit from the project so that the food poverty gap will not expand. As such, this will address the distribution inefficiency to those areas that are experiencing hunger. Correspondingly, a more sustainable solution to alleviate state of hunger is to provide employment. As emphasized in the regression, food expenditure is more sensitive to changes in the salaries and wages. Providing a stable employment will relieve the government the burden of continuously providing food for the poor; instead, focus resources to other avenues of development such as agrarian reform and infrastructural development.

Allowing poor households to provide food for them will allow the government to invest in technology in order to enhance food production in the regions that have the potential to supply

food to the entire country such as Central Luzon, Southern Mindanao, and Western Visayas. Food production and distribution in the country must be for the benefit of everyone regardless of social status resulting to a more equitable distribution of food in the country. Conversely, since the Philippines served as the model for quality rice production in Southeast Asia, the Philippines has to regain that niche in rice production by investing in research and development on how to improve the quality and quantity of rice production. Rationally, the government must invest in resources that will cultivate a sustainable source of marine products through the establishments of highly advanced fish pens, factories, marine farms and the like.

Likewise the government can opt to explore a strategy to enhance food production and slowly start reducing the importation of rice from Vietnam and Thailand. The country must harness again its potential in producing its own rice for national consumption and whatever excess for exportation. With this, the funds that are supposedly used to import rice can be reallocated for research development and technology to further enhance food production in the country. In this sense, the Philippines can achieve sustainability in terms of food production in the long term.

Lastly, this study would like to articulate that the government can only do so much in alleviating the state of hunger of impoverished households. If the government cannot enforce a more sustainable way of relieving the poor from the chains of poverty; and would simply utilize band-aid solutions to solve the pressing problem of hunger, then poor households will forever free ride on government efforts as exemplified in the regression. Hence, a sustainable and long run solution that this study recommends is the provision of livelihood programs. However, the government must not be lenient in the provision of livelihood programs for the poor. It must be implemented in such a way that the recipient must soley strategize and sustain the livelihood or else they will be held responsible for the consequences of their mismanagement or falsehood. The fact that the funds used for the redistribution of wealth is coming from the people's money, there is no reason for the poor not to get things right. The government can take advantage of the Filipino's attitude towards shame.

Addressing poverty is indeed a tedious task for the government that it might require not only political will but the implementation of unpopular decisions such as the intolerance for the extreme dependence of the poor on the government. The government and the poor must work together to make poverty alleviation feasible. The poor must harness the support being provided by the government instead of forever relying on their support. The government has to address other issues in the country aside from poverty. It would really help if both the government and the poor will do its part in addressing the problem. Government efforts would just be put to waste if efforts are not sustainable; hence, it is a must that the poor accompanies the efforts of the government by also striving independently to allow them to climb the social ladder.

ENDNOTES

[1] This paper was culled from the study of Rivera, Pizarro, Aliping & Reyes (2012) entitled *Determining the Link Between the State of Poverty and Food Inequality: Implications on Government's Poverty Reduction Programs in the Philippines* funded by the Angelo King Institute of De La Salle University (DLSU), Manila, Philippines in

cooperation with the Community Based Monitoring Systems (CBMS).The content and findings of this study do not represent or reflect the views of DLSU and Bangko Sentral ng Pilipinas (BSP).

[2] The income gap is the average income shortfall of the population from the poverty threshold (Todaro & Smith, 2006).

[3] The poverty gap is the total income shortfall of the population from the poverty threshold (Todarot & Smith, 2006).

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TABLES AND FIGURES

Table 1: Annual Per Capita Thresholds and Poverty Incidence in the Philippines

Year	**2003**	**2006**	**2009**
Annual Per Capita Poverty Threshold (PHP)	10,976	13,348	16,841
Poverty Incidence (%)			
Families	20	21.1	20.9
Population	24.9	26.4	26.5
Magnitude of poor (in million)			
Families	3.29	3.67	3.86
Population	19.8	22.17	23.14
Subsistence Incidence (%)			
Families	8.2	8.7	7.9
Population	11.1	11.7	10.8
Magnitude of subsistence poor (in million)			
Families	1.36	1.51	1.45
Population	8.8	9.85	9.44

Source: National Statistical Coordination Board (NSCB)

Table 2: Income Gap, Poverty Gap and Severity of Poverty			
Year	**2003**	**2006**	**2009**
Income Gap	27.7	27.2	25.7
Poverty Gap	5.6	5.7	2.7
Severity of Poverty	2.2	2.2	2
Source: National Statistical Coordination Board (NSCB)			

Table 3: Poverty Incidence in Selected Provinces (NCR District IV, Eastern Samar, and Agusan Del Sur)									
Year / Province	**2003**	**2006**	**2009**	**2003**	**2006**	**2009**	**2003**	**2006**	**2009**
	Annual Per Capita Poverty Threshold			**Poverty Incidence Among Families (%)**			**Poverty Incidence Among Population (%)**		
NCR District IV	13,997	16,487	19,802	1.8	2.9	1.6	2.7	5.0	2.5
Eastern Samar	10,106	12,195	16,385	29.8	37.6	45.8	36.4	47.8	54.0
Agusan Del Sur	11,226	14,004	18,443	48.5	45.5	51.2	56.0	53.9	58.1
				Magnitude of Poor Families			**Magnitude of Poor Population**		
NCR District				10,769	17,942	12,389	78,834	145,819	88,850
Eastern Samar				22,642	31,165	41,359	141,236	206,979	237,122
Agusan Del Sur				54,915	54,433	57,189	313,709	319,936	343,060
Source: National Statistical Coordination Board (NSCB)									

Table 4: Annual Per Capita Poverty Threshold and Poverty Incidence among Families												
Region	**Annual Per Capita Poverty Threshold (PHP)**			**Poverty Incidence among Families**						**Share to Total Poor Families**		
				Estimate			**Coefficient of Variation**					
	2003	**2006**	**2009**	**2003**	**2006**	**2009**	**2003**	**2006**	**2009**	**2003**	**2006**	**2009**
Philippines	10,976	13,348	16,841	20	21.1	20.9	2.3	2.3	2.1	100	100	100
NCR	13,997	16,487	19,802	2.1	3.4	2.6	12	13.1	12	1.5	2.2	1.7
CAR	10,881	12,976	16,122	16.1	18.6	17.1	11.2	12.8	11.8	1.4	1.5	1.4
Ilocos	11,791	14,350	17,768	17.8	20.4	17.8	7.8	7.6	7	4.7	5.3	4.6
Cagayan Valley	10,350	12,212	15,306	15.2	15.5	14.5	8.4	9.2	8.3	2.7	2.6	2.4
Central Luzon	12,771	15,374	18,981	9.4	12	12	8.6	8.4	7.6	5.2	6.2	6.3
CALABARZON	12,394	14,284	17,779	9.2	9.4	10.3	8.7	10.6	7.9	6.1	5.7	6.4
MIMAROPA	10,398	12,610	15,769	29.8	34.3	27.6	6.6	7.2	6.8	4.5	5.1	4.2
Bicol	11,476	13,645	17,146	38	36.1	36	4.9	5	4.2	10.9	9.9	10
Western Visayas	10,548	12,432	16,036	23.5	22.1	23.8	6.7	7.2	6.4	9.1	8.2	9
Central Visayas	11,798	14,468	17,848	32.1	33.5	30.2	6.5	6.4	6.3	11.8	11.8	10.8
Eastern Visayas	9,850	11,885	15,910	30.2	31.1	33.2	5.9	5.8	5.3	6.9	6.9	7.4
Zamboanga Peninsula	9,642	11,810	15,160	40.5	34.2	36.6	7.1	9.3	6.7	7.2	6.1	6.3
Northern Mindanao	10,501	12,987	16,568	32.4	32.7	32.8	7.2	5.7	5.8	7.3	7	7.1
Davao	10,737	13,469	17,040	25.4	26.2	25.6	8.3	8.7	8.4	6.3	6	5.9
SOCCSKSARGEN	10,277	12,530	15,762	27.2	27.1	28.1	8.1	7	6.7	5.8	5.5	5.8
Caraga	10,355	12,935	16,858	37.6	36.9	39.8	6.2	6.4	5.4	4.7	4.5	4.9
ARMM	9,664	12,358	16,334	25	36.5	38.1	10.1	7.4	6.1	3.8	5.3	5.7
Source: National Statistical Coordination Board (NSCB)												

Table 5: Results of the Generalized Method of Moments (GMM) Regression (Dependent Variable: Food Consumption)			
Variables	**Coefficient**	**Standard Error**	**Probability Value**
$RENT_i$	1.3561	0.0146	0.000
$WAGES_i$	0.4422	0.0018	0.000
$AGRI_i$	0.4886	0.0022	0.000
$INDSTRY_i$	0.6967	0.0049	0.000
$SRVCS_i$	0.2872	0.0028	0.000
$OTHR_i$	0.2415	0.0028	0.000
$INTRST_i$	0.9141	0.2609	0.000
$CONAB_i$	0.0159	0.0038	0.000
DIV_i	0.4066	0.2136	0.057
$GAMB_i$	0.0446	0.0467	0.906
constant	7803.8540	60.7578	0.000

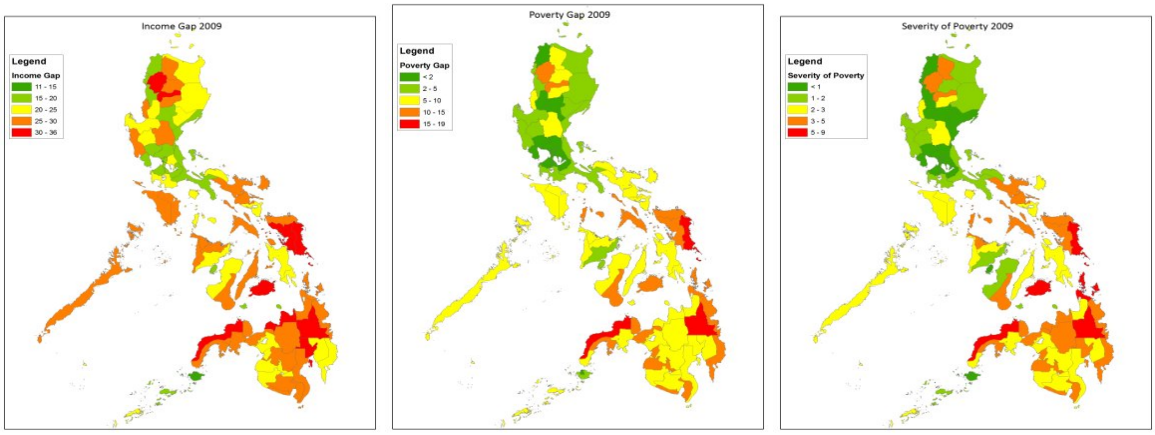
Table 6: Estimated Marginal Effects (Dependent Variable: Food Consumption)			
Variables	**ey/ex**	**Standard Error**	**Probability Value**
$RENT_i$	0.0137	0.0001	0.000
$WAGES_i$	0.2918	0.0011	0.000
$AGRI_i$	0.1760	0.0008	0.000
$INDSTRY_i$	0.0107	0.0001	0.000
$SRVCS_i$	0.0304	0.0002	0.000
$OTHR_i$	0.1026	0.0011	0.000
$INTRST_i$	0.0001	0.0000	0.000
$CONAB_i$	0.0008	0.0002	0.000
DIV_i	0.0000	0.0000	0.023
$GAMB_i$	0.0004	0.0005	0.325

Table 7: Selected Descriptive Statistics									
Variables	**Pasay**			**Eastern Samar**			**Agusan Del Sur**		
	Mean	**Standard Deviation**	**Skewness**	**Mean**	**Standard Deviation**	**Skewness**	**Mean**	**Standard Deviation**	**Skewness**
$HSIZE_i$	4.1980	2.0689	1.7265	4.5129	2.2613	0.6619	6.0776	2.3704	0.7116
$INCOME_i$	220,962.80	2,373,431.00	181.32	68,230.18	90,669.01	3.21	79,900.7100	379,458.3000	204.7220
$LNINCOME_i$	11.9394	0.7743	(0.3112)	10.4874	1.1758	(0.1367)	10.7236	1.0253	(0.2522)

Table 8: Ordinary Least Squares (OLS) Regression Dependent Variable: Log of Total Income									
Variables	**Pasay**			**Eastern Samar**			**Agusan Del Sur**		
	Coefficient	**Standard Error**	**Probability Value**	**Coefficient**	**Standard Error**	**Probability Value**	**Coefficient**	**Standard Error**	**Probability Value**
$ELEMGRAD_i$	0.0884	0.0184	0.0000	0.3130	0.1837	0.0890	0.0380	0.0081	0.0000
$HSUNDR_i$	0.0408	0.0177	0.2100	0.0236	0.0954	0.8050	0.3468	0.0034	0.0000
$HSGRAD_i$	0.2089	0.0153	0.0000	0.3123	0.1488	0.0360	0.3853	0.0067	0.0000
$PSUNDR_i$	0.3239	0.0422	0.0000	-	-	-	0.7242	0.0238	0.0000
$PSGRAD_i$	0.3678	0.0202	0.0000	0.1823	0.8205	0.8240	0.8517	0.0341	0.0000
$COLUNDR_i$	0.3999	0.0163	0.0000	0.4106	0.1113	0.0000	0.9219	0.0057	0.0000
$COLGRAD_i$	0.6952	0.0162	0.0000	0.6435	0.1307	0.0000	1.4293	0.0077	0.0000
$WMSPHD_i$	0.8535	0.1625	0.0000	-0.7614	0.6708	0.2570	1.3659	0.1099	0.0000
Constant	11.6379	0.0142	0.0000	10.3257	0.0572	0.0000	10.5369	0.0016	0.0000

Table 9: Marginal Effects After Logit									
Variables	**Pasay**			**Eastern Samar**			**Agusan Del Sur**		
	Coefficient	**Standard Error**	**Probability Value**	**Coefficient**	**Standard Error**	**Probability Value**	**Coefficient**	**Standard Error**	**Probability Value**
$HSIZE_i$	0.0015	0.0002	0.0000	0.0094	0.0049	0.0560	0.0713	0.0003	0.0000
$LNINCOME_i$	-0.0243	0.0024	0.0000	-0.0780	0.0530	0.1410	-1.7387	0.0026	0.0000
$PERMANENT_i$	-0.0328	0.0053	0.0000	-0.1778	0.0349	0.0000	-0.0303	0.0025	0.0000
$SEASONAL_i$	-0.0061	0.0011	0.0000	-0.0730	0.0215	0.0010	-0.0197	0.0024	0.0000
$WOMEN_i$	0.0075	0.0035	0.0340	-	-	-	-	-	-
$FEEDING_i$	-	-	-	0.1693	0.1077	0.1160	0.0020	0.0033	0.5470
$HEALTH_i$	0.0013	0.0010	0.1980	0.0228	0.0250	0.3610	0.0132	0.0016	0.0000
$SCHOLAR_i$	0.0068	0.0042	0.1020	-	-	-	0.0509	0.0075	0.0000
$TRAINING_i$	0.0112	0.0067	0.0950	-0.0259	0.0866	0.7650	0.0167	0.0049	0.0010
$HOUSING_i$	0.0072	0.0069	0.2950	-	-	-	-0.0392	0.0082	0.0000
$CREDIT_i$	0.0055	0.0049	0.2610	0.0097	0.0454	0.8300	-0.0265	0.0024	0.0000

Figure 1: Thematic Map of 2009 Income Gap, Poverty Gap, Severity of Poverty



Source: National Statistical Coordination Board (NSCB)

HOW SEVERE IS THE IMPACT OF CLIMATE CHANGE ON CROP PRODUCTION IN THE MEKONG DELTA-VIETNAM?

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ABSTRACT

The study used the Ricardian approach to examine the economic impact of climate change on crop production in Mekong Delta, Vietnam. Net farm revenue is regressed against various explanatory variables, including climate, soil, inundation, irrigation and other socio-economic variables to examine their influence on variability on net farm revenues. The findings show that net farm revenues are affected negatively by increasing in temperature and positively by increasing in precipitation. Under selected climate scenarios in Vietnam, the study predicted that crop net revenue are expected to fall approximately VND 500 billion in 2050; and by VND 670 to 1,300 billion by the year 2100.

INTRODUCTION

Climate change is a global phenomenon with potentially huge effects on national economic and social development in many countries. "It is generally recognized that, among all sectors, agricultural production activities are the most sensitive and vulnerable to climate change" (IPCC, 2007). According to FAO (2007), 11 percent of arable land in developing countries could be decreased by climate change that leads 65 countries facing the reduction in production. This leads the question of what potential consequences of climate change to the world are. In an open economy, the impacts of climate change on agriculture of each country, especially the exported countries, cannot be isolated from the rest of the world. Through international market transaction, the changes in regional climate may lead to changes the agricultural production and affect the world agricultural prices.

Situated in the Tropic of Cancer and $80^0 N$ latitude, "Vietnam has been described as one of the most vulnerable country to climate change" (Oxfarm, 2009; Yusuf and Francisco, 2009). Among of that, agriculture sector would be the most harmful due to it highly depended on climate variables. In Vietnam, Mekong Delta is considered as the "rice bowl" of the whole country. This region supplied more than fifty percent of rice to Vietnam and plays an important indispensable role in rice export market. Beside rice production, the livelihoods of the most local people are also derived from other crops, exotic tropical fruit trees, livestock, and aqua-culture systems. The development of farming systems in the Mekong Delta depends heavily on natural resources, canal excavation, the process of settlement and land reclamation. Therefore, people livelihoods are susceptible to the change in weather and climate due to their impacts on ecosystems, water and soil. Despite the potential negative effects on agriculture have been recognized, the scale of the effects was not clearly pointed out.

While mitigation of greenhouse gases is considered as a reactive response to climate change, adaptation methods are seen as priorities for any vulnerable community to cope with the

impacts of climate change**.** Therefore, information about the potential economic impacts under various climatic scenarios is one of the vital inputs required for policy process on mitigation and adaptation. In other words, before the appropriate policy responses can be designed, the government needs the information of how severe the potential impacts would be. This study was carried to quantify the economic impacts on crop production, and to examine the magnitude of crop revenue loss under alternative scenarios of climate change on the Mekong Delta agriculture. The research findings are expected to address the socio-economic changes, and be useful for policy makers in designing conceptual frameworks and actions on regional adaptation strategies in response to changes in climate.

HYPOTHESES

Based on literature on the economic impacts of climatic variables to agriculture, there are two hypotheses to be tested in this study.

H1: *Net revenue of the farmers in the Mekong Delta is decreased significantly by the increase in temperature*

H2: *Net revenue of the farmers in the Mekong Delta is decreased significantly by the decrease in precipitation*

METHODOLOGY AND DATA

In recent years, many economists have applied the new economic approach proposed by Mendelsohn, Nordhaus, and Shaw (1994) to incorporate farm-level adaptation into the analysis effects of climatic change on agriculture. This approach was named 'Ricardian' since it based on the theory of land rent, which originated with David Ricardo (1772–1823). The model assumes that farmers maximizes net revenue (NR) subject to the exogenous conditions of their farms. Particularly, farmers choose the crops, cropping patterns, and inputs that maximize:

$$Max\ \pi\ (NR) = P_{qi}Q_i\ (X, C) -\ P_{xi}X_i - P_L L \qquad (1)$$

where π (NR) is net revenue, P_{qi} is the market price of crops *i*, Q_i is a production function for crops i, X is a vector of inputs such as labor, seeds, fertilizer, and pesticides, tractors, C is a vector of site specific of exogenous climate and environmental factors such as temperature, precipitation, soil, other characteristic of production sites; P_{xi} is a vector of prices for the annual inputs (X), P_L is Where P_L is annual cost or rent of land, and L_i is the amount of land used for producing Q_i. Perfect competition will drive profits (net revenue) to zero, that is:

$$P_{qi}Q_i^*\ (X, C) -\ P_{xi}X_i^* - P_L L^* = 0 \qquad (2)$$

the production of crop "*i*" is the best use for the land, given climate and environment C and the factors prices P_{xi}, the observed market rent on the land will be equal to the annual net profits from the production of the crop *i* (Mano and Nhemachema, 2007). Under the assumption of constant in market prices in new conditions of climate, and if farmers choose the crops and each inputs in order to maximize in land value (or in net revenue), the resulting net revenue will be determined by exogenous variables that they can't choose.

Thus, the model attempted to link land values (or farm revenue) and climate variables via econometric models by using cross-sectional data. To estimate a Ricardian model, both land value and net revenue per year can be used as the dependent variable, and the relationship between temperature, precipitation and land values is expected to be nonlinear (Mendelsohn *et. al.* 1994, 2001; Seo and Mendelsohn, 2007; Kurukulasuriya *et. al*. 2006). Net revenue per year, and a quadratic functional form for climate variables have been used in this study.

Data sources for study mainly extracted from production and socio-economic data of Vietnam Household Living Standards Survey (VHLSS-2008) for the Mekong Delta. The data included 13 provinces across different agro-ecological systems that is enable represent for the Mekong Delta region. The 13 provinces includes Long An, Tien Giang, Ben Tre, Dong Thap, Vinh Long, Tra Vinh, An Giang, Can Tho, Soc Trang, Bac Lieu, Ca Mau, Kien Giang and Hau Giang.

The climate data were collected monthly from the website of Ministry of Agriculture and Rural Development (MARD). The temperature and precipitation data of the year 2007 are based on actual measurements in 11 national meteorological Center in Mekong Delta, Vietnam. The climatic data of each household is estimated from each commune to the shortest meteorological station at the districts. Due to the two-season characterized climate in the Mekong Delta, climate variables were separated into 2 seasons, namely dry season and rainy season.

Soil and inundation data were collected by the soil maps and inundation maps extracted from Food and Agriculture Organization (FAO, 2007) and Ministry of Natural Resources and Environment (MONRE).

In order to analyzing of the effect of climate on agriculture, the climate data were matched with the socio-economic data of each farm household. Moreover, to make sure that having a accurate match between the crop revenue data and other data, like, socio-economic data, climatic data, soil and inundation information, the sample was only accepted whenever it can complete all information of each household, otherwise it was rejected. In total, the final sample includes 528 households from 13 provinces.

MODEL SPECIFICATION AND ANALYTICAL STEPS

Model specification

The estimate model in this study is specified as follow: The dependent variable is net revenue (NR) per hectare and in unit of million Vietnam Dong. The climate variables: Td, Tr and Pd, Pr represent temperature and rainfall in dry season (November-April) and rainy season(May to October), respectively. Quadratic terms of four climatic variables are included in the model. Control variables include four types of soil presented by 3 dummies (soil_1, soil_2 and soil_3), five salinity intrusion levels (inun_1, inun_2, inun_3 and inun_4), irrigation and other social economic variable including sex, education, and age of the household head. Beside the main model, two separate regressions for rain-fed and irrigated land are also estimated. Table 1 shows the definition, notation, expected signs, and units of variable measurement.

$$\pi(NR) = \alpha_0 + \beta_1 Td + \beta_2 Td2 + \beta_3 Tr + \beta_4 Tr2 + \beta_5 Pd + \beta_6 Pd2 + \beta_7 \Pr + \beta_8 \Pr 2 + \beta_9 inun\_1 + \beta_{10} Inun\_2 + \beta_{11} Inun\_3 + \beta_{12} Inun\_4 + \alpha_1 Soil\_1 + \alpha_2 Soil\_2 + \alpha_3 Soil\_3 + \mu_1 IRRI + \mu_2 Age + \mu_3 Sex + \mu_4 Edu \quad (3)$$

Table 1: Definition of Variables in the Model			
Notation	Explanation	Unit	Expected signs
NR	Net crop revenue per ha = (total revenue-total cost)/ha	Million VND	Dependent variable
Td	The average temperature in dry season	(degree Celsius)	(+/-)
Td	The square of average temperature in dry season	(degree Celsius)^2	(+/-)
Tr	The average temperature in rainy season	(degree Celsius)	(+/-)
Tr2	The square of average temperature in rainy season	(degree Celsius)^2	(+/-)
Pd	The average precipitation in dry season	(mm)	(+/-)
Pd2	The square of average precipitation in dry season	(mm)^2	(+/-)
Pr	The average precipitation in rainy season	(mm)	(+/-)
Pr2	The square of average precipitation in rainy season	(mm)^2	(+/-)
Inun_4	Inundation at level 1 (0.5-2.5 g/l)	= 1, otherwise=0	(-)
Inun_3	Inundation at level 2 (2.5-5 g/l)	= 1, otherwise=0	(-)
Inun_2	Inundation at level 3 (5-15 g/l)	= 1, otherwise=0	(-)
Inun_1	Inundation at level 4 of more than 15g/l	= 1, otherwise=0	(-)
Soil_1	Acid sulfate soil	= 1, otherwise=0	(-)
Soil_2	Saline soil	= 1, otherwise=0	(-)
Soil_3	Alluvial soil	= 1, otherwise=0	(+)
IRRI	Irrigation	irrigated=1	(+)
Age	age of the head	(number of years)	(+)
Edu	education level of the head	(schooling years)	(+)
Sex	gender of the head of household	male=1; female=0	(+)

Analytical steps

Step 1, Compute marginal changes

Upon estimation of the model, the marginal changes will be computed for prediction as temperature and the precipitation change by one unit. In order words, the effects of an infinitesimal change in climatic variables can be observed throughout marginal impact analysis. By using results from Ricardian model above, the marginal impacts of the climate coefficients is computed by taking the first derivative of the function with respect to climatic variables (temperature and precipitation). The change in net revenue due to marginal change in climatic X is then,

$$\frac{\partial(\pi / ha)}{\partial X} = \frac{\alpha_0 + \beta_1 X + \beta_2 X^2}{\partial X} = (\beta_1 + 2\beta_2 X) \quad (4)$$

- Marginal change in temperature in dry season: $\frac{\partial(\pi / ha)}{\partial T_{DRY}} = (\beta_1 + 2\beta_2 T_d)$ (5)
- Marginal change in temperature in rainy season: $\frac{\partial(\pi / ha)}{\partial T_{RAIN}} = (\beta_3 + 2\beta_4 T_r)$ (6)
- Marginal change in precipitation in dry season: $\frac{\partial(\pi / ha)}{\partial P_{DRY}} = (\beta_5 + 2\beta_6 P_d)$ (7)

- Marginal change in precipitation in rainy season: $\frac{\partial(\pi / ha)}{\partial P_{RAIN}} = (\beta_7 + 2\beta_8 T_r)$ (8)
- The marginal impact (MI) for the whole year is sum of the marginal impact of temperature and precipitation for 2 seasons.
-

$$MI = \sum \left[(\beta_1 + 2\beta_2 T_d) + (\beta_3 + 2\beta_4 T_r) + (\beta_5 + 2\beta_6 P_d) + (\beta_7 + 2\beta_8 P_r) \right] \quad (9)$$

Step 2: Estimate the impacts of alternative climate scenarios

The impact of climate change on the net revenue per hectare was analyzed using uniformly changed temperature and precipitation levels. These scenarios assume that only one aspect of climate changes and that the change in uniform across the region (Deressa, 2007). The climate scenarios for the Mekong Delta are based on the scenarios developed by MONRE (2009). The economic impacts of change in climatic scenarios on net revenue per hectare would be estimated under regression coefficients results.

$$\Delta(NR) = NR_{C2} - NR_{C1} \quad (10)$$

Where NR_{C1} is net revenue per hectare at the climate condition C_1- the base climate scenarios with temperature T_1 and precipitation P_1.

NR_{C2} is net revenue per hectare at the climate condition C_2- the new climate scenarios with Temperature T_2 and Precipitation P_2

$$T_2 = T_1 + \Delta T \quad (11)$$
$$P_2 = P_1 + \Delta P \quad (12)$$

ΔT and ΔP are change in temperature and precipitation. Hence, the change in net revenue per hectare is then,

$$\Delta(NR) = (\beta_1 T_d + \beta_2 T_d^2 + \beta_3 T_r + \beta_4 T_r^2 + \beta_5 P_d + \beta_6 P_d^2 + \beta_7 P_r + \beta_8 P_r^2) - [\beta_1(T_d+\Delta T_d) + \beta_2(T_d+\Delta T_d)^2 + \beta_3(T_r+\Delta T_r) + \beta_4(T_r+\Delta T_r)^2 + \beta_5(P_d+\Delta P_d) + \beta_6(P_d+\Delta P_d) + \beta_7(P_r+\Delta P_r) + \beta_8(P_r+\Delta P_r)^2]$$
$$= \beta_1 \Delta T_d + \beta_2(2T_d\Delta T_d + \Delta T_d^2) + \beta_3 \Delta T_r + \beta_4(2T_r\Delta T_r + \Delta T_r^2) + \beta_5 \Delta P_d + \beta_6(2P_d\Delta P_d + \Delta P_d^2) + \beta_7 \Delta P_r + \beta_8(2P_r\Delta P_r^2 + \Delta P_r^2) \quad (13)$$

Based on the value of change in net revenue per hectare, this research continues to explore the impacts for the whole Mekong Delta region by using the number of hectares for crop cultivation (W) will be multiplied with the change in net revenue per hectare.

$$\text{Aggregated climate impact} = \text{Sum}(\Delta(NR) * W) \quad (14)$$

RESULT AND DISCUSSION

Table 2 presents parameter estimates of the crop revenue per hectare models for the Mekong Delta, namely, all farms, irrigated farms and rain-fed farms. There are 9 significant variables in the all farms model; those significant variables are only 7 for the irrigated farm

model; and in the rain-fed model, the number of significant variables is 8. The significance of F-Tests show the overall fit of the three model specifications. According to figures in Table 2, most of the climate variables are significant and many of the coefficients of the squared terms are significant. This implies that the climatic variables are non-linear and has a quadratic relationship with the net revenue per hectare, which is consistent to available evidence in the literature.

All Farms Model

For all farms model, most of the coefficients of the temperature and precipitation are significant. The net revenue per hectare responses to temperature in dry season and rainy season were all concave, showing that net revenues were highly sensitive to temperature. Similarly, the significance of rainfall coefficients implied that both temperature and precipitation influenced directly net revenue per hectare of farm households. Beside climatic variables, the other variables also showed their influence on the net crop revenue. In the model for all farms, the soil and inundation variables (included in the model to help capture spatial heterogeneity across the sampled households) were statistically significant in explaining variability in net revenue across households.

The effects of soil types on net revenue were somehow reasonable from the expectation. There is only one soil type significantly affecting to net revenue, soil type 3. Soil_1 (acid sulphate soil) and soil_2 (saline soil) have insignificant impacts on net revenue. The explanation for soil 1 and soil 2 is that these soils are generally very low fertile and containing some amount of salt or toxic ions that causing unsuitable conditions for crop growth. The alluvial soil (Soil_3) on the other hand, usually is high fertility and provides good alluvial which boost crop productivity.

The dummy variables, Inun_1, Inun_2, Inun_3 and Inun_4 (which were included to proxy for inundation) were negatively related to net revenue per hectare for whole farm sample. Among the four variables, there was only one variable significant, inun_1 (the relatively high in saline level). This could be attributed to the fact that crop productivity is reduced at higher level of salt concentration.

The irrigation coefficient was significant and positive in explaining the variability of net farm revenue per hectare. The result further emphasizes the importance of irrigation as a factor affecting net revenue. In addition, household characteristics namely, the age and gender of the household head were found to be insignificant with dependent variable. The education level, however, was significant with net crop revenue per hectare. The positive significant of education coefficient in the model implies that higher the level of education, the higher net revenue the farmer receives.

Irrigated and Rain-fed Farm Models

For irrigated and rain-fed farm models**,** the regression results showed that farms with irrigation were not as sensitive to temperature and precipitation as rain-fed farm. While net revenue per hectare had a inverse U-shaped relationship with temperature in dry seasons, the relationship of net revenue per hectare with precipitation was linear in both dry and rainy seasons.

The coefficients of inundation variables were quite different in magnitude for rain-fed and irrigated farms. In irrigated farms, three of four inundation variables (Inun_1, Inun_2 and

Inun_3) were found to be negative and significant correlated with net revenue. However, in rain-fed farm model those coefficients behaved the converse result when two of four inundation variables (Inun_2 and Inun_3) were positively significant. This can be explained perhaps by adaptation of farmers through shifting to another suitable crop variety in saline soil. In other words, the farmer finds that it profitable to switch from old crop to the new kind of crop or new kind of production technique.

The story seems conversely in term of soil variables. While soil 3 was positive significant in the irrigated model, similarly to the model of all farms, it was not meaningful to the dependent variable in the rain-fed model. This implies that in the rain-fed farms, the soil types don't influence the net revenue per hectare.

Other factors including education, gender and age of the head of household were found to be insignificant in both rain-fed and irrigated farms.

Table 2: Parameter estimates of the crop net revenue per hectare model for Mekong Delta

Variables	All farms		Irrigated farms		Rain-fed farms	
	Coefficients	**t-stat.**	**Coefficients**	**t-stat.**	**Coefficients**	**t-stat.**
Td	579.12	0.61	314.78	0.13	-1481.40	-2.16*
Td2	-26.73	-2.28*	-81.52	-3.96***	-40.18	2.21*
Tr	1410.55	1.60	-774.64	-0.33	-811.75	-0.78
Tr2	-63.75	-2.73**	-69.78	-1.59	-28.25	-2.92**
Pd	43.32	1.08	73.22	1.69*	0.04	0.01
Pd2	1.03	1.79*	0.16	0.16	1.40	4.84***
Pr	188.78	3.72***	156.23	1.96*	241.81	4.65***
Pr2	-0.30	-3.26***	-0.20	-1.41	-0.44	-4.50***
Inun_1	-1139.87	-1.73*	-2744.84	-2.40**	709.33	1.20
Inun_2	-870.83	-1.29	-2740.35	-2.39*	1036.36	1.68*
Inun_3	-495.59	-0.73	-2653.64	-2.32*	2177.04	3.56**
Inun_4	-803.69	-1.15	-1746.13	-1.48	507.32	0.79
Soil_1	-130.74	-0.23	-39.45	-0.04	-373.08	-0.83
Soil_2	385.75	0.68	-19.27	-0.02	259.58	0.47
Soil_3	1535.66	2.91**	2117.78	2.63**	-754.84	-1.37
IRRI	2930.37	6.84***				
Sex	-24.13	-0.04	-728.07	-0.77	246.55	0.50
Age	16.92	1.00	-2.81	-0.10	5.47	0.34
Edu	143.32	1.95*	142.17	1.16	53.63	0.78
(constant)	118.23	0.05	110909.18	2.55**	-132.75	-0.09
No. of observations		528	252		276	
F-test	19.39***		12.80**		10.65**	
R-square	0.37		0.40		0.34	

Note:,**,*** Indicates significant at 10%, 5% and 1% level, respectively*

Marginal Impacts

The marginal impacts of temperature and precipitation on crop revenue calculated at the mean in the sample are presented in Table 3. For all farms, annually, the marginal net revenue per hectare of each household would decrease the amount of VND 181 due to the increase (an infinitesimal rise) in temperature. Hill-shaped relationships of net revenue and temperature were also found in dry and rainy seasons. However, the marginal impacts were more severe in rainy season. The marginal results confirm the research hypothesis is that *an increase in the mean temperature would decrease the crop net revenue*.

able 3: Marginal impacts of climate on crop net revenue per hectare			
	All farms	**Irrigated farms**	**Rain-fed farms**
Temperature (VND/ha/^{0}C)			
Dry season	-53.45	-163.05	-1561.76
Rainy season	-127.50		-56.49
Annual	-180.95	-163.05	-1618.25
Precipitation (VND/ha/mm)			
Dry season	2.05	73.22	2.80
Rainy season	188.17	156.23	240.94
Annual	190.22	229.45	243.74

Net revenue increases as precipitation (Pd) increases in dry season and for the whole year. The marginal results confirm the research hypothesis is that *a decrease in the mean precipitation would decrease the crop net revenue*. However, in rainy season as the Pr2 is negative significant, the net revenue per hectare confirms hill-shaped relationship with precipitation and the marginal value is VND 188. According to Figure 1, after attaining the maximum value at precipitation of approximately 300mm per month in rainy season, the net revenue per hectare slightly reduces. Figures in Table 3 also show that the marginal impacts of temperature and precipitation on rain-fed farms are higher than those on irrigated farms.

Figure 1: Estimated Net revenue per hectare versus Temperature

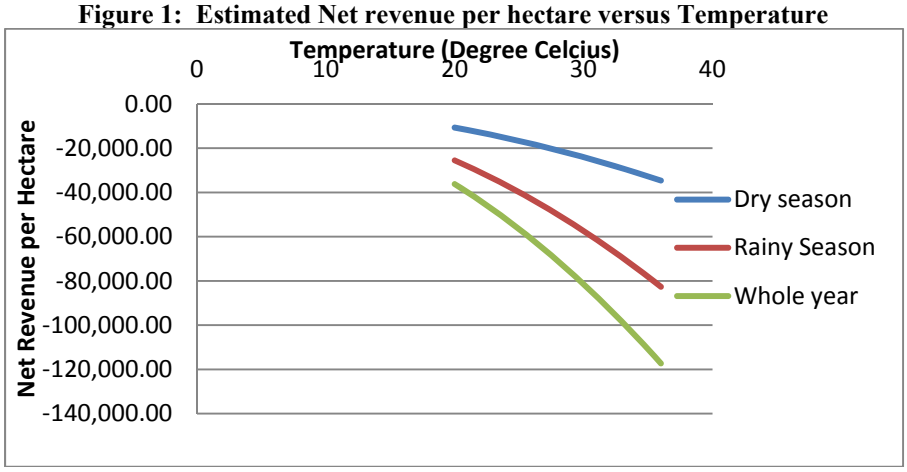
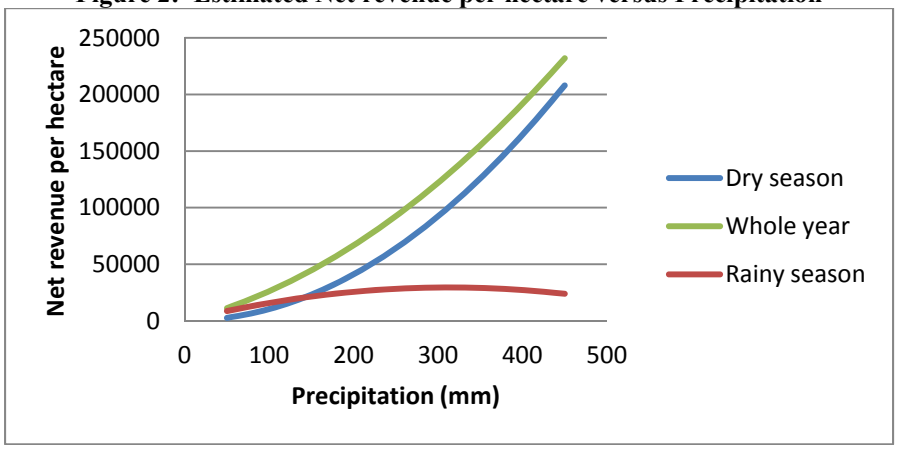


Figure 2: Estimated Net revenue per hectare versus Precipitation



Estimate the Impacts of Alternative Climate Scenarios

In order to show what the coefficients estimated from all farms regression model implied for the Mekong Delta agriculture, the uniform climate scenarios across the region were also tested. The assumption that climate change being uniform across the Mekong Delta region is realistic because the climate in the South of Vietnam is considered rather similar. For the scenario analysis, this study employed the climate change project for Vietnam conducted by MONRE (2009). There are three scenarios for three level of emission level were used, including low emission B1, medium emission B2 and high emission A2 in the next 10 decades (Table A1 and Table A2 in the appendix). Two tables summarize the climate scenarios for Mekong Delta for the years 2020 and 2100 in four month periods of each year.

Table 4: The change in net revenue in the future three scenarios

Scenarios	Per hectare (VND thousand/ha)			For the whole Mekong Delta (VND billions)		
	2020	**2050**	**2100**	**2020**	**2050**	**2100**
Low emission (B1)	-80.23	-195.52	-263.90	-204.64	-498.71	-673.14
Medium emission (B2)	-80.25	-211.03	-400.19	-204.69	-538.28	-1,020.76
High emission (A2)	-88.33	-201.09	-511.64	-225.30	-512.92	-1,305.03
The exchange rate in the year of 2008: US$ 1 = VND 16,500						

In general, the temperature in Mekong Delta River was predicted moderately increase over time, approximately 1^0C rise in was predicted in three scenarios in 2050. This number would be 1.35^0C in B1 scenario, 2^0C in B2 scenario and 2.65^0C in A2 scenario in 2100. The change temperature in dry season increases less than the change in rainy season. Rainfall predictions, however, steadily decrease in dry season and slightly increase in rainy season. For the whole year, B1, B2 and A2 predicted the rainfall would reduce by -2.5%, -3.8% and -4.8%, respectively. Table 4 presents the predicted changes in the net revenue per hectare and for the Mekong Delta, under the three climate scenarios for the years from 2020 to 2100. In 2050, the net revenue per hectare would lose around VND 200 thousand under three scenarios. However, this number will be significant different in the year 2100 with the lost range would be from VND 263 thousand to VND 511 thousand per hectare. Using the figure on the available arable land in the region, the net revenue lost is estimated from VND 673 to 1,305 billion per year (equivalent to US$ 36-79 billion) for the three scenarios.

CONCLUSION

This study attempted to examine the economic impacts of climate change on crop-growing activities in the Mekong Delta- Vietnam, by using a Ricardian model and to estimate the magnitude of crop revenue loss under alternative scenarios of climate change. Estimations were under-taken for all farms (full sample), irrigated farms and rain-fed farms, and also separately for dry and rainy season.

Findings showed that the Mekong Delta would be vulnerable to climate change as temperature increase and precipitation decrease in the next coming years. Climatic impacts were found to have non-linear relationships with net crop revenue. The increase in temperature in the

future tends to harm net revenue in both irrigation and rain-fed farm. The rise in rainfall will be benefic for crop farming, especially for rain-fed farms. Result also showed that climate change posed different effects on net crop revenue across agro-ecological zones.

Regarding to types of farms, the results indicated that irrigated farm and rain-fed farm responses to the change in climate were not the same. That is, irrigated farms seem less damage than rain-fed farms do due to the available substitute for rain-water in dry season. In addition, the results also revealed that irrigation variable in the all farms model was positive and significant with net revenue. This emphasizes the importance of irrigation factor for farmers to mitigate the impact, particular in dry season.

According to estimated marginal impacts, an infinitesimal rise in mean temperature would have negative impact on annual crop net revenue. In the story of precipitation, the decrease in rainfall would cause the marginal revenue for all farms, irrigated farms and rained farms.

The study also employed three of the climate scenarios to observe how crop revenue will be changed in the next decades. The uniform scenarios showed that a 1^0C increase in temperature and 2% decrease in precipitation would decrease net crop revenue in Mekong Delta by around VND 500 billion for all farms in 2050 under three scenarios. To the year 2100, when the temperature is expected to rise 1.4^0C and precipitation decrease 2.5%, the study predicted that net crop revenue would fall as much as approximately VND 673 billion in B1, VND 1020 billion for B2 and VND 1305 billion for A2 scenario.

Research findings suggest that promoting expansion of irrigation is an essential policy message helping farmers to adapt to the change in future climate. Careful selection of kinds of crop and seed also should be taken into consideration. The government should encourage the development of diversification from traditional to new crop varieties which are more heat tolerant and saline resistance. In areas where the salinity of soil increases as a consequence of sea level rise can be switched from agriculture to aquaculture.

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APPENDIX

Table A1
Mean temperature change (^{0}C) in South, Vietnam relative to the period of 1980-1999 with three emission scenarios

Scenarios	Month periods	2020	2030	2040	2050	2060	2070	2080	2090	2100
Low emission (B1)	Dec - Feb	0.3	0.5	0.6	0.8	0.9	1.1	1.1	1.1	1.1
	Mar - May	0.4	0.6	0.8	0.9	1.0	1.2	1.2	1.3	1.3
	Jun - Aug	0.5	0.7	0.9	1.1	1.3	1.4	1.5	1.5	1.5
	Sep - Nov	0.5	0.6	0.9	1.2	1.2	1.4	1.5	1.5	1.5
Medium emission (B2)	Dec - Feb	0.3	0.5	0.6	0.8	1.0	1.3	1.5	1.5	1.7
	Mar - May	0.4	0.6	0.8	0.9	1.2	1.4	1.7	1.8	1.9
	Jun - Aug	0.5	0.7	0.9	1.2	1.5	1.8	2.0	2.1	2.1
	Sep - Nov	0.5	0.6	0.9	1.2	1.4	1.8	1.9	2.1	2.3
High emission (A2)	Dec - Feb	0.3	0.5	0.7	0.8	1.0	1.3	1.3	1.8	2.1
	Mar - May	0.4	0.6	0.8	0.9	1.2	1.5	1.9	2.1	2.7
	Jun - Aug	0.6	0.7	0.9	1.2	1.5	1.8	2.2	2.6	2.9
	Sep - Nov	0.5	0.7	1.0	1.2	1.5	1.8	2.1	2.5	2.9

Source: MONRE. 2009

Table A2
Rainfall change (%) in South, Vietnam relative to the period of 1980-1999 with three emission scenarios

Scenarios	Month periods	2020	2030	2040	2050	2060	2070	2080	2090	2100
Low emission (B1)	Dec - Feb	-2.7	-4.4	-6.2	-7.7	-7.7	-9.4	-9.1	-10.1	-10.1
	Mar - May	-2.6	-3.6	-5.8	-7.2	-8.1	-8.7	-9.2	-9.4	-9.4
	Jun - Aug	0.3	0.5	0.6	0.8	0.9	1.0	1.1	1.1	1.1
	Sep - Nov	2.6	3.8	5	6.3	7.3	8.1	8.3	8.5	8.5
Medium emission (B2)	Dec - Feb	-3.0	-4.4	-6.2	-8.1	-8.7	-11.4	-12.8	-14.2	-15.4
	Mar - May	-2.8	-4.1	-5.8	-7.5	-9.1	-10.6	12.0	-13.2	-14.3
	Jun - Aug	0.3	0.5	0.6	0.9	1.1	1.2	1.4	1.5	1.6
	Sep - Nov	2.6	3.8	5.3	6.8	8.3	9.6	10.9	11.9	13.0
High emission (A2)	Dec - Feb	-3.3	-4.5	-5.9	-7.4	-9.7	-12	-14.4	-16.9	-19.6
	Mar - May	-3.0	-4.2	-5.5	-7.2	-9.0	-11.1	-13.3	-15.7	-18.2
	Jun - Aug	0.4	0.5	0.6	0.8	1.0	1.3	1.5	1.8	2.1
	Sep - Nov	2.8	3.8	5.0	6.5	8.2	9.3	12.1	14.3	16.5

Source: MONRE. 2009

TECHNOLOGY, INSTITUTIONS AND PRODUCTIVITY: VIETNAMESE MANUFACTURING EVIDENCE

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ABSTRACT

This paper investigates the determinants of productivity in Vietnamese manufacturing industries using firm level cross-section data in 2008. We analyze impacts of technology and institutions on firm productivity in considering different types of firms by productivity level. The findings give evidence that while technological factors such as foreign ownership, ISO certificate, owning a website appear to keep consistent effects for all types of firms, institutional factors result in different impacts subject to low- or high-productivity firms.

INTRODUCTION

Vietnam is in the early stage of industrialization process with the importance of manufacturing activities in the economy. The manufacturing industries occupy the largest share in the GDP growth, but their contributions get a signal of stagnation (31.9 percent of overall GDP growth in the period 2006 – 2009 compared with 31.7 percent in 2001 – 2005). Among many reasons highlighted the problems of low capital efficiency, labor productivity and the inefficiency as well as the obstacles from the recent institutions (Nguyen & Pham, 2010).

The literature to-date relating to firm productive performance effects of technology and institutions is a somewhat shortcoming in Vietnam. After a short period of over-excitement in the first time of WTO member from early 2007, GDP growth of the whole economy and GDP growth by manufacturing industries decreased tremendously. Recent achievements are lower than state's potential and capability. Economic growth quality, productivity, efficiency and competitiveness are low and improved slowly (The Ninth Central Committee Conference, 2009).

It is agreed that the weaknesses of the economy and the manufacturing in the context of global economic crisis could be overcome to some extents if the technological and institutional factors had not created obstacles to economic development (see Vietnamese Business Forum Report, 2011). However, the empirical evidence on these constraints on the productivity of Vietnamese enterprises is rather limited. For examples, Nguyen and Nishijima (2009), using firm level cross-section data Vietnamese manufacturing industries derived from the World Bank survey in 2005, find that obstacles in policy, administration and social environment hinder firms from increasing their intensity of exports, but not the cases of constraints from physical infrastructure and factor markets. Basing on time-varying inefficiency models for the World Bank Investment Climate surveys data in 2005 and 2009, Long (2011) empirically indicates a good quality of infrastructure and finance, an investment-friendly and transparent environment, a safe society encourage firm technical efficiency. The results highlight that foreign firms attain

improvement in production efficiency over time compared to domestic firms and large firms as well as foreign firms get benefits from their exports.

Given the above limited results, this paper provides evidence on the link between technology, institutions and productivity using firm level data collected in Vietnam as part of the World Bank Enterprise Survey 2009. The empirical results document that some technological variables, for example, investing in research, patenting and licensing, labor training and educational level of top manager are insignificant. However, other technological factors such as foreign ownership, ISO certificate, owning a website and educational level of employee appear to have impact on firm productivity. For institutional factors, there is no evidence that access to finance, labor issues affect firm performance and other institutional variables such as practices of competitors in the informal sectors, obstacles in policy and administration have different impacts depending on firm level productivity.

The remainder of the paper is organized as follows: the next section outlines literature review and issues to be explored. Section 3 describes research methodology. Section 4 is for data and variable descriptions. Econometric results are discussed in Section 5 and section 6 concludes.

LITERATURE REVIEW AND ISSUES TO BE EXPLORED

One way of increasing productivity is through innovative activity such as inventing new technologies or investing in research, patenting and licensing (Baumol, 2002). However, this kind of activity acquires large efforts and faces risks of failure. Innovation in less developed countries (LDCs) may be more suitable in using existing technologies than creating new ones. Hence, the importance of building up a technological capability in adopting new technologies developed outside has been considered (Lall, 1992). Firms in LDCs can access to existing technologies by licensing contracts, cooperation agreements or receiving foreign investments together with training their workforce.

Besides technological activities, institutions that guide and shape human interactions have impacts on firm performance through incentives to invest (see Coase, 1998; Williamson, 1987). Efficient institutions can increase returns of economic activity, create new investment opportunities and fairer games for all types of formal sectors. In the other side, bad institutions may lead businesses to undertake inefficient and costly alternative investment. Institutions can be formal rules including laws, regulations, property right or informal such as norms, habits and practices, social conventions (Goedhuys *et al*, 2006).

In the study 'Business climate and Employment Growth: The impact of Access to finance, Corruption and Regulations across firms', Aterido, Hallward-Driemeier and Pagés (2007) regress employment growth on the investment climate constraints controlling for a variety of firm characteristics. They find that low access to finance and ineffective business regulations reduce the growth of all firms, especially micro and small firms. Corruption and poor infrastructure create growth bottlenecks for medium and large firms.

Goedhuys, Janz and Mohnen (2006) use micro data set of the World Bank Investment Climate Survey to investigate how technology and institutions affect productivity in Tanzanian

manufacturing firms. They find some of the institutional variables such as formal credit constraints, administrative burdens related to regulations, business support services and membership of a business association are highly significant and robust to different specifications of the model while only indirect technological variables (ISO certification, foreign ownership and high education of the manager) appear to affect productivity.

Hallward-Driemeier, Scott and Xu (2006) discuss how ownership and business climate impact on firm performance using China investment climate survey 2000. They regress four different firm performances (sales growth, investment rate, productivity and employment growth) on business climate indicators (measured as city-industry averages) and control variables. The results show that the variable ownership is significant, labor market flexibility weakly significant and no evidence that physical infrastructure and average access to finance affect firm performance.

RESEARCH METHODOLOGY

In order to examine the impacts of technological and institutional factors on firm level productivity, we start off with a Cobb – Douglas – type production function similar to Goedhuys et al (2006).

$$Y_i = A(T_{1,i}, T_{2,i})K_i^{\alpha}L_i^{\beta}e^{\varepsilon_i} \qquad (1)$$

Valued added Y_i is a function of traditional variables such as capital K_i and labor L_i as well as total factor productivity A. It means that Y_i can increase without an increase in the quantity of inputs K_i, L_i once there is an increase in efficiency A. Technological variables $T_{1,i}$ and institutional variables $T_{2,i}$ are observable factors explaining differences in productivity and assumed that they do not affect the marginal productivity of capital and labor.

Productivity can be calculated as the ratio of an output to a specific factor or to all relevant factors of production. In this paper, we apply the non parametric measure of productivity – the labor productivity, which gives the simple and meaningful way of firm productive performance.

Dividing both side of the equation (1) by L and taking logarithms we get:

$$\ln(Y_i/L_i) = \ln A(T_{1,i}, T_{2,i}) + \alpha\ln(K_i/L_i) + (\alpha + \beta - 1)\ln L_i + \varepsilon_i \qquad (2)$$

In this equation, total factor productivity is assumed to be a linear function of technological and institutional variables. The coefficient of $\ln L_i$ measures the deviation from constant returns to scale.

Furthermore, firm can increase the labor productivity by operating at higher capacity so equation (2) can be adjusted like that:

$$\ln(Y_i/L_i) = \ln A(T_{1,i}, T_{2,i}) + \alpha\ln(K_i/L_i) + (\alpha + \beta - 1)\ln L_i + \gamma CU + \varepsilon_i \qquad (3)$$

with variable CU is termed for capital utilization and expected to be positive.

This equation is estimated by two different techniques: Ordinary Least Squares (OLS) regression and Quantile regression (QR). While OLS is the useful tool for summarizing the average relationship between the outcome and its predictors, based on the conditional mean function, this provides only a partial view of the relationship. Heterogeneity in firms' characteristics and abilities that are not reflected in explaining variables are assumed to be random and to vanish in the mean. Possible differences across firms are thus ruled out (Goedhuys *et al*, 2006). Therefore, if we want to have a more complete picture that provides information about the relationship between technology, institutions and productivity at different points in the conditional distribution of the productivity, QR is a statistical tool for building just that picture (Cameron & Trivedi, 2009).

QR is an extremum estimator but instead of minimizing the sum squared residuals like OLS, it minimizes the objective function:

$$Q(\delta_q) = \sum_{i:y_i \geq x_i'b}^{N} q|y_i - x_i'b_q| + \sum_{i:y_i < x_i'b}^{N} (1 - q)|y_i - x_i'b_q| \qquad (4)$$

where $0 < q < 1$ and b_q is used to reveal that different choices of q estimate different values of b.

If q = 0.25, much more weights is placed on prediction for observations with $y_i < x_i'b$ (the low-productivity firms) than for observations with $y_i \geq x_i'b$ (the high-productivity firms). The lower quartile presents the less productive firms.

If q = 0.5, giving the least absolute deviations estimator. In the median regression, the coefficients will be estimated by minimizing the absolute deviations from the median. As an estimate of central tendency, the median is a resistant measure that is not as greatly affected by outliers as is the mean.

If q = 0.75, much more weights is placed on prediction for observations with $y_i \geq x_i'b$ (the high-productivity firms) than for observations with $y_i < x_i'b$ (the low-productivity firms). The upper quartile presents the high productive firms.

DATA AND VARIABLE DESCRIPTIONS

The data are derived from the Enterprise Survey undertaken in Vietnam by the World Bank in 2009 – 2010. The survey covers 1053 firms in five regions containing 14 provinces – Red River Delta (Ha Noi, Ha Tay, Hai Duong, and Hai Phong), the North Central Coast (Thanh Hoa, Nghe An), Mekong River Delta (Can Tho, Long An, Tien Giang), South Central Coast (Khanh Hoa, Da Nang) and South East (Ho Chi Minh City, Binh Duong, Dong Nai). The data are stratified by industry, establishment size and region with 808 enterprises selected from the manufacturing sector. Excluding observations with missing information, we have a total of 545 observations available for the analysis.

Table 1: Composition of Sample in Terms of Industry, Region and Firm Size				
Region				
Industry	**North**	**Centre**	**South**	**Total**
Food	31	30	54	115
Textiles	24	02	65	91
Garments	32	14	54	100
Non metallic products	44	29	59	132
Metallic products	40	24	43	107
Total	171	99	275	545
Firm size (number of employee)				
Industry	**5 – 19**	**20 – 99**	**100+**	**Total**
Food	30	41	44	115
Textiles	16	44	31	91
Garments	9	29	62	100
Non metallic products	14	53	65	132
Metallic products	29	42	36	197
Total	98	209	238	545

The variables involved in the regression are defined as follows:

Labor productivity *VA/L* is measured by the value added per employee. Value added is the value of total sales minus costs of raw materials, intermediate goods, fuel and electricity. All values are for the year 2008.

The variable labor *L* is the number of total employees in the given year. It is the sum of permanent workers and adjusted temporary workers. The number of adjusted temporary workers is the total number of paid short-term workers multiplied by the average length of employment for each of these workers and then divided by the average length of employment of permanent workers.

The capital input *K* is the firm's capital stock – the net value of fixed assets (net value of machinery, vehicles, equipments, land and building) by the end of the year 2008.

Besides the traditional variables labor and capital, two additional sets of variables are constructed. One presents the technological issues that firms can choose to improve their technological capability in producing goods, another relates to the institutional environment in which firms operate.

Firms can build up a stock of technological knowledge through a knowledge accumulation process, for example, investing in research and development activities. The dummy variable *Patent*, a proxy variable for R&D, equals 1 for firms have any patents registered in Vietnam or abroad and 0 if not. But more practically, firms can use technology from abroad through establishing ownership linkages or through licensing from foreign-owned companies in the case of LDCs. *Foreign* is a dummy variable, equals 1 if firms have foreign ownership and 0 otherwise. A firm is defined having foreign ownership when its foreign capital accounts for at least 10 percent of its total capital. The dummy variable *License* is 1 for firms that use technology licensed from a foreign-owned company and 0 otherwise.

However, making use of technology or efficiently applying R&D results on production depends much on the educational level of the workers and the top manager as well as the firms'

training activities. The dummy variable *Education of employee* is the average educational degree of a typical production worker in a firm, equals 1 if high school level or higher and 0 if under high school level. *Education of Top manager*, a dummy variable for top manager's educational level, is 1 if university degree or higher and 0 otherwise. The dummy variable *Training* equals 1 for firms offering formal training to their employees and 0 if not.

Furthermore, by attaining and maintaining the criteria of international quality certifications and owning a website, firms have the efficient ways to communicate, introduce themselves and get more chances to successfully access to clients. These really make sense for firms in LDCs to improve their performances and internationally integrate. In this analysis, *ISO certification* is a dummy variable that equals 1 if firms have an internationally-recognized quality certification such as ISO 9000, 9002 or 14000 and 0 otherwise. Another dummy variable *Internet* is 1 if firms own a website and 0 if not.

The World Bank (2004) reports that a better investment climate improves bureaucratic performances and predictability, and contributes to the effective delivery of public goods that are necessary for productive business. It can be said the institutional environment firms operate in has an essential role for firm performance. Basing on the survey questionnaires and the feedbacks of respondents relating to the biggest obstacle faced by their firms. We design four institutional dummy variables for the regression analysis.

Informal compete equals 1 for firms report 'Practices of competitors in the informal sector' is obstacle for their business.

Access to Finance is 1 if firms report 'Access to finance' which includes availability and cost, interest rate, fees and collateral requirements to be obstacle.

Labor problem equals 1 if firms recognize that 'Inadequately educated workforce', 'Labour regulations', severely hamper their current operations.

Governance is 1 for firms report 'Customs and trade regulations', 'Business licensing and permits', 'Tax administration', 'Tax rates' severely hamper their performance.

Dummy variables are also introduced to control for variations across regions and industries as follows

Industry dummies: because of the limited sizes of some original industries, we combine chemicals, plastics & rubber and non metallic mineral product into one group industry (called non metallic products) and basic metals, fabricated metal products and machinery and equipment into another group industry (named metallic products), making a new classification of five industries in the manufacturing sector. There are four industry dummies with Food industry as the reference group.

Region dummies: due to the differences in industrial development degree among regions, we combine Central North, Southern Central Coastal into one region (called the Centre) and Mekong River Delta and South East into another region (called the South). There are two region dummies with the North as the reference group.

ECONOMETRIC RESULTS

The empirical results are summarized in tables 2 and 3. Table 2 presents OLS results for three different models. The simple model is without the technological and institutional variables, the extended model includes all and the reduced one excludes insignificant technological variables.

In the simple model, all predictors are highly significant. Increasing returns to scale is a characteristic of production function in the manufacturing industries. The marginal product of capital is 0.279 and an elasticity of scale is 1.095. However, these parameters drop further once technological and institutional variables are in the extended model. Constant return to scale cannot be rejected going with the lower coefficients of capital and scale elasticities. These confirmations are more clearly in the reduced model.

In the extended model, all of the explaining variables have signs as expected except *License* and *Training* (both of them are insignificant). These are surprised but may be the case of manufacturing industries in Vietnam. Labor training activity is necessary to improve the productivity but not in the short run because it might reduce the amount of labor involving in the production process while firms have to face the deadline in completing their production contracts. Moreover, most of the Vietnamese manufacturing enterprises are processors with cheap labor, they are not under pressure to have the new but costly technology through licensing (see Nguyen & Pham, 2010). Furthermore, some technological variables do not have statistically significant such as *Patent* and *Education of Top manager* in contrast to *Foreign*, *Education of employee*, *ISO certification* and *Internet*. These suggest that knowledge through R&D and the educational level of top manager may not improve the firm productivity at least in the short run. The regression results confirm the case that foreign owned firms have a significantly higher productivity than firms without foreign ownership and the positive impact of having internationally-recognized quality certificates on firm performance. Not to be surprised, the average educational level of workers and owning a website have positively significant effects on firm productivity.

Table 2: Results of OLS Regressions

Dependent variable: Log value added per employee	**OLS Regressions**		
	Simple model	**Extended model**	**Reduced model**
Traditional variables			
Log Labor	.140 (.039) ***	-.051 (.050)	-.047 (.047)
Log (Capital/Labor)	.279 (.043) ***	.237 (.043) ***	.225 (.043) ***
Capital Utilisation	1.095(.318) ***	1.002 (.340) ***	.956 (.342) ***
Technological variables			
Patent		.177 (.219)	
Foreign		.645 (.152) ***	.598 (.149) ***
License		-.048 (.191)	
Education of employee		.223 (.110) **	.202 (.109) *
Education of top manager		.131 (.131)	
Training		-.101 (.121)	
ISO certification		.314 (.143) **	.317 (.136) **
Internet		.386 (.119) ***	.384 (.117) ***

Table 2: Results of OLS Regressions			
Dependent variable:	**OLS Regressions**		
Log value added per employee	**Simple model**	**Extended model**	**Reduced model**
Institutional variables			
Informal compete		-.201 (.110) *	-.184 (.109) *
Access to Finance		-.029 (.114)	-.042 (.112)
Labor problem		-.181 (.219)	-.146 (.194)
Governance		-.016 (.158)	-.020 (.159)
Constant	11.736 (.866) ***	12.946 (.956) ***	13.274 (.941) ***
R-squared	.2	.3	.3
Number of observations	378	367	372
Notes: (1) ***, **, and * denote significance level of 1%, 5%, and 10% respectively. (2) Robust standard errors in parentheses. (3) All regressions include industry and region fixed-effects			

Institutional variables on the contrary have a less portion of the variance of firm productivity. Although all variables get expected signs, *Accesses to Finance*, *Labor problem* and *Governance* do not have any significant impact on firm productivity except *Informal compete* variable. These results, to some extents, are similar to the study of Hallward-Driemeier and Xu (2006) for Chinese manufacturing firms. It can be said that accelerating integration to the world economy and becoming an official member of WTO in early 2007, investment climate and business environment of Vietnam have been improved to meet the new requirements (see Dordi et al, 2008; MPI, 2010). However, these improvements are not enough and synchronous (Dang, 2009). Hence, the impact of institutional factors on firm productivity should be considered carefully.

Firms can face different conditions and cope with different problems at different levels of productivity. Technological activities may be organized differently in low- and high-productivity firms. Institutional problems affect firms in different ways depending on firm level productivity. Because the results from OLS regressions just give out the average relationship between technology, institutions and productivity, we further apply the quantile regressions.

Table 3: Results of Quantile Regressions			
Dependent variable:	**Quantile Regressions**		
Log value added per employee	**Lower quartile**	**Median**	**Upper quartile**
Traditional variables			
Log Labor	-.085 (.053)	-.064 (.068)	-.119 (.075)
Log (Capital/Labor)	.213 (.058) ***	.176 (.057) ***	.228 (.057) ***
Capital Utilisation	.655 (.377) *	.786 (.375) **	.732 (.415) *
Technological variables			
Foreign	.490 (.194) **	.576 (.218) ***	.914 (.214) ***
Education of employee	.175 (.142)	.236 (.129) *	.210 (.158)
ISO certification	.464 (.176) ***	.447 (.160) ***	.527 (.208) **
Internet	.430 (.137) ***	.420 (.143) ***	.359 (.169) ***
Institutional variables			
Informal compete	-.007 (.141)	-.081 (.149)	-.306 (.157) *
Access to Finance	-.130 (.1288)	-.086 (.138)	-.121 (.168)
Labor problem	.313 (.402)	.126 (.317)	-.448 (.431)

Table 3: Results of Quantile Regressions			
Dependent variable:	**Quantile Regressions**		
Log value added per employee	**Lower quartile**	**Median**	**Upper quartile**
Governance	-.277 (.167) *	-.077 (.237)	.078 (.259)
Constant	13.097 (1.301) ***	14.265 (1.190) ***	14.304 (1.281) ***
Pseudo R-squared	.16	.18	.21
Number of observations	372	362	372
Notes: (1) ***, **, and * denote significance level of 1%, 5%, and 10% respectively. (2) All regressions include industry and region fixed-effects. (3) Bootstrap standard errors with 250 replications.			

Table 3 presents results for the different levels of productivity firms have reflected by the median regression, the lower and upper quantiles. Comparing the average and median firms, the coefficients differ considerably but not much for their signs and statistically significant information provided. However, the more interesting picture emerges by the different results for low- and high-productivity firms. Both types of firms share the characteristic of constant returns to scale but the low-productivity firms have lower marginal productivity of capital. Looking at the technological variables, the roles of foreign ownership, ISO certificate and owning a website are robust in different kinds of specifications. The differences between the low- and high-productivity firms are revealed through institutional variables. Practices of competitors in the informal sectors hamper the high-productivity firms while the obstacles caused by business licensing and permits, customs and trade regulation, tax rates and tax administration hurdle the performance of low-productivity firms.

CONCLUSION

Using a cross-section data set of Vietnamese manufacturing industries in 2008 we investigate the productivity effects of technology and institutions. Our results show that the positive impacts of some technological factors such as foreign ownership, ISO certificate, owning a website and educational level of employee on firm productivity are robust to different types of specifications. However, institutional factors have a less portion of the variance of firm productivity. There is no evidence that access to finance and labor issues appear to affect firm performance and other institutional variables such as practices of competitors in the informal sectors, obstacles in policy and administration have different impacts depending on the firm level productivity. The results also point out the problem of constant returns to scale in Vietnamese manufacturing industries and the limitations of innovative activities and training labor in firms. These findings are in line with the research of Goedhuys, Janz and Mohnen (2006), who argue that firm productivity differences are not only explained by differences in production factors or in technology, but also in the role of institutions.

The main policy conclusion from this analysis is that the effects of institutions on firm productivity can differ substantially across firm level productivity. Further investigation of the different impacts of institutions on firm productivity remains high on our future research agenda.

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MAURITIUS AS A SUCCESS STORY FOR FDI: WHAT STRATEGY AND POLICY LESSONS CAN EMERGING MARKETS LEARN?

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ABSTRACT

This study uses a policy approach to examine the role of Foreign Direct Investment (FDI) in the 'Mauritian economic miracle' years of 1970-2000. In the early stage of industrialization, the Mauritian government turned the island into an Export Processing Zone. The objective was to attract foreign direct investors in the textile and clothing industry who would then export the finished manufactured products to European and North American markets. This study analyzes how the spillover and linkage effects between FDI, productivity, domestic investment, and exports impacted economic growth. The results indicate that it was FDI stock, rather than FDI inflows, that led to the growth success. In addition, it was the heavily FDI-driven export sector which was the driving force of economic growth. The study also highlights the challenges that Mauritius faced during its development path, lessons that emerging countries can learn and policy recommendations on how to reposition Mauritius going forward.

Keywords: FDI spillovers, exports, growth, emerging markets

INTRODUCTION

Mauritius has recurrently been cited as a development success story by the World Bank and the International Monetary Fund (Subramaniam, 2001; Zafar, 2011). This small island economy has been a historical evidence against the pessimistic prognosis of Nobel Laureate James Meade who regarded the Mauritian economy as a case of the Malthusian trap (Meade, 1961, 1967). He predicted that the economy would have poor development prospects due to its heavy dependence on its sugar-based agricultural sector, high vulnerability to trade shocks, rapid population growth rate and rising ethnical tensions. Yet, in addition to maintaining national stability and social cohesion, the island economy has sustained a high and stable economic growth rate averaging 5 percent annually between 1970 and 2000 (World Bank's World Development Indicators, 2002). This period, often called the "Mauritian economic miracle," has generally been attributed to the role of foreign direct investment (FDI) transforming the country from a stagnant mono-crop economy to one with sustainable growth and development. Supporters of FDI argue that FDI, as a composite bundle of capital stock, knowledge and technology (Balasubramanyam *et al*, 1996), has the potential to act as an engine of economic growth by providing the necessary conditions for the economy to move up the value chain.

When the island gained independence from Britain in 1968, the economy was characterized by high unemployment, chronic balance of payments deficit, low levels of savings and investment as well as low economic growth averaging to less than 0.3 percent annually (WDI, 2002). The then newly formed government soon realized that the heavy dependence on sugar exports and the import-substitution policies would not remedy the poor economic health of the country. Significant structural changes had to be made to compensate for the lack of domestic natural resources. In order to address the domestic problems, the government took a daring decision to adopt an export-oriented strategy, starting with the establishment of the Export Processing Zone (EPZ) in 1970. The aim was to attract export-oriented foreign direct investors and to rely on the potential benefits of FDI through spillover and linkage effects.

Special fiscal and financial incentives were offered including tax holidays on corporate profits, exemption from income tax for distributed dividends, highly subsidized infrastructural provisions, duty-free imports of inputs, unlimited repatriation of profits and unrestricted ownership. These investment incentive schemes attracted not only FDI but also domestic entrepreneurs to the textile and clothing industry. Over the 1970-1977 period, the EPZ sector took-off, driven by increase in FDI, domestic investment, exports and employment. The balance of payments situation improved noticeably during this period. Over the next three decades, the contribution of the EPZ sector to GDP was remarkable; it increased from 2.6 percent in 1976 to 13 percent in 1990 (Dabee and Greenaway, 2000) and averaged 12 percent annually up to 2000. The EPZ sector is still the second most important foreign exchange earner of the economy, next to the sugar industry.

However, in the 1990s, the economy began to slow down. The very factors which initially attracted FDI altered to such an extent that they began acting as a deterrent. Rising cost conditions, productivity lags, the phasing out of the Mauritian preferential access to European markets and the erosion of the tax holidays reduced the competitiveness of the economy and led to erratic inflows of FDI. Concerns were raised given that FDI plays an imperative role in generating employment and enabling the transfer of knowledge and technology (Ancharaz, 2003). In small developing economies such as Mauritius, this type of investment represents an important source of capital, particularly when the economy is striving to embark on a diversification strategy towards high value added sectors.

In order to devise Mauritius' future development strategy, it is important to assess what impacts FDI had on the economy especially during the boom years of 1980-2000. This study investigates whether FDI had growth-enhancing effects in the Mauritian economy. This is done by also accounting for the contributions of domestic investment and exports and the potential spillover effects of FDI on these. Because of the limited availability of disaggregated datasets, this study adopts a policy oriented approach.

FDI AND GROWTH: THEORY AND EVIDENCE

Theoretical Framework

A number of channels through which FDI can lead to growth-enhancing effects have been analyzed. The theoretical evidence shows that there are three main channels through which FDI can promote growth: by quantitatively increasing the factor inputs through additions to the stock of economic assets, by qualitatively improving the use of existing factors of production, and by increasing the productivity of the domestic factors of production already in use.

The first channel can be argued to be in line with Solow (1957) type neoclassical growth models. The contribution of FDI inflows is essentially regarded as quantitative given that they effectively represent additions to the capital stock of the host country. In these models, no regards are given to the endogenous qualities of FDI and no distinction is made between domestic investment and FDI in terms of their effects. Consequently, the impacts of FDI inflows on economic growth are not substantially different from domestic investment. Because such models assume diminishing returns to capital, FDI has no permanent impacts on economic growth. The second and third channels are to some extent interrelated. The presence of FDI leads to qualitative improvements of the domestic resources which in turn boost their productivity in host economies. For instance, foreign direct investors can improve upon the quality of human capital through the introduction of labor training, managerial practices and organizational arrangements and these can subsequently lead to an increase in labor productivity.

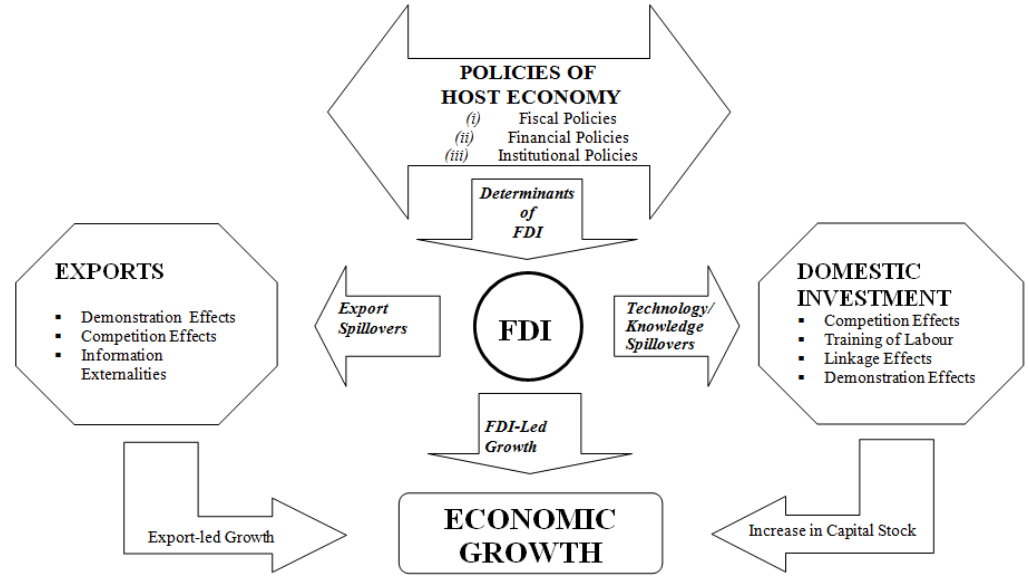
Among these three channels, it is productivity growth that is of utmost importance for the long-run advances in economic growth. The role of FDI in this process is crucial as it can lead to an expansion in productivity either through a number of direct or indirect channels (Blomström *et al*, 1999). The direct channel refers to the improvement in efficiency through the reallocation of resources while the indirect channel refers to the spillover effects of knowledge and technology.

In the analysis of economic growth, one can neither overlook the roles played by domestic investment and exports nor their relationship to FDI in this process. Sun (1998) summarizes this nexus as follows: FDI inflows can stimulate domestic investment through spillover or linkage effects in the production chain when the multinationals (MNCs) enter the host economy. Besides, it is claimed that FDI firms may possess a better knowledge about foreign markets, more experience in product development, and better expertise in international marketing in addition to a superior awareness in inter-country differences in cost conditions. Hence, their presence in host economies can enhance the exposure of domestic firms to trade practices and consequently boost their export capacities as noted by Athukorala *et al* (1995). The relationship between FDI, exports, domestic investment and growth in host countries is summarized in Figure 1.

As domestic firms absorb the spillover effects from FDI, there could be an increase in domestic investment due to a quantitative or qualitative improvement in the use of resources. Likewise, local firms also benefit from export spillovers. Hanson and Lundin (2003) made an interesting observation claiming that more productive firms will increase their export

propensities, while less productive ones will target mainly the domestic market. Overall, inward FDI improves the allocative and productive efficiencies of domestic firms leading to higher productivity, reduced transaction costs, improved quality and standard of products, and enhanced export competitiveness of domestic firms on the international market. Together, these factors are expected to promote economic growth.

Figure 1. The Role of FDI in Host Countries



Source: Authors own representation

Microeconomic Studies

A large number of empirical studies have examined the impacts of FDI on economic growth but the results are at best mixed. These studies can be categorized into microeconomic or macroeconomic studies. Empirical evidence at the microeconomic level falls into two categories: case studies and microeconomic studies. These studies use firm and industry level datasets, mainly cross-sectional and panel, to analyze the impacts of FDI on economic growth primarily in the form of spillover or linkage effects. Overall, the results are at best mixed.

Among case studies, Gershenberg (1987) carried out a survey on indigenous senior managers in Kenyan manufacturing firms and found that MNCs provide more labor training than private local firms. He also found that labor tends to stay with MNCs rather than migrate to domestic firms. Larrain *et al* (2000) also observed that FDI inflows in Costa Rica motivate an increase in human capital. Investment by Intel generated new labor training programs coordinated by higher education institutions and consequently attracted new suppliers in the economy. Hanson (2001), however, argued that the prospects of technological spillover effects were limited due to a lack of domestic competitors and suppliers. He drew these conclusions based on the analysis of three major Latin American FDI experiences, namely those of General Motors and Ford in Brazil and Intel in Costa Rica. The last two case studies seem to highlight

that a threshold level of development is crucial in order to enhance the absorptive capacity of domestic economies.

Other case studies reveal that greater benefits can be derived from the presence of FDI if the investment climates are healthy and if government policies are geared towards the promotion of linkage effects. The study of Lim and Fong (1982) demonstrates that foreign affiliates helped three electronics investors in Singapore to become exporters by enabling them to achieve economies of scale, better technology, improved quality and better prices. Rhee and Belot (1990), however, showed that the impacts of foreign affiliates can be beyond the individual firm. In their case study of eleven developing countries, they found that FDI inflows act as a catalyst and reinforce the expansion of the export-oriented industries. The increase in export intensities of the textile industries in Mauritius and Bangladesh, the plywood industry in Indonesia and the flower industry in Columbia is mainly the outcome of demonstration effects and migration of technical staffs. Based on these case studies, FDI can increase productivity by training labor, promoting an efficient allocation of resources and creating linkage effects.

The empirical findings of microeconomic studies on the spillover effects of FDI, too, are mixed. Earlier microeconomic studies tend to focus on the statistical relationship between proxies of foreign presence and productivity to assess the impacts of FDI in the host countries. Caves (1974) and Globerman (1979) pioneered the empirical literature using cross-sectional data from Australia and Canada respectively. Both studies found evidence that greater foreign presence is correlated with greater productivity in the host countries. Over the years, the two-sample (foreign and domestic firms) models were refined and various proxies for productivity and foreign presence were used.

The use of cross-sectional datasets has been common in many empirical studies including Blomström and Persson (1983), Blomström (1986), Blomström and Wolff (1994) and Kokko (1994) on Mexico, Sjöholm (1999a, 1999b) on Indonesia and Driffield (2001) on the UK. However, although all of these studies claim to reveal positive spillover effects of FDI inflows, they do not control for time-invariant factors. Thus, a positive relationship may be wrongly interpreted as an increase in FDI inflows causing productivity to increase when, in fact, it might be the high level of productivity that has attracted FDI.

In the search of more precise estimates, later studies used panel data analysis, especially at the firm level, as did Aitken and Harrison (1999) for Venezuela, Kathuria (2000) for India and several researchers for the UK-based studies, namely, Girma *et al* (2001), Girma and Wakelin (2000, 2001), and Harris and Robinson (2004). In fact, Görg and Strobl (2001) argue that the use of panel data analysis is the most appropriate estimation procedure to analyze the true extent of productivity spillovers. It allows the researcher to follow the changes in productivity growth of domestic firms across time. Moreover, it enables the investigation of a number of factors that might affect the spillover effects as well as controls for endogeneity bias.

Among the panel data studies mentioned above, only three of them reveal a reduction in the productivity of domestic firms arising from the entrance of FDI firms, namely those of Aitken and Harrison (1999), Djankov and Hoekman (2000), and Barry *et al* (2005). Others find either a positive or an inconclusive evidence. Aitken and Harrison (1999) argue that the result of negative spillover effects is due to negative competition effects. The superior knowledge that

FDI firms possess in terms of production and marketing techniques allow them to operate at a lower marginal cost than domestic rivals. Consequently, to maintain their market share the latter are forced to reduce production which increases costs. Barry *et al* (2005) also find a negative impact of FDI on productivity but they argued that FDI firms do not compete with domestic firms in the product market. Instead, competition arises in the labor market, particularly for skilled labor. Increased demand for skilled labor by MNCs drive up the wage rate, compelling domestic firms to match it in order to stay in the market. Hence, the chance of survival of smaller firms is minimal and thus they are crowded-out of the industry.

Some studies demonstrate no or inconclusive evidence of productivity spillover effects of FDI. Kokko *et al* (2001) argue that the trade regime of the host country determines the magnitude and extent of productivity spillovers. They argue that if an economy has an import-substitution regime, productivity spillovers can be expected to be positive due to competition effects, assuming that FDI does not crowd-out domestic firms. However, as the economy opens up and adopts an export-promotion strategy, fewer opportunities for productivity spillovers would arise since MNCs would more likely focus on the marketing and distribution networks rather than on the production technologies. Consequently, the presence of FDI does not affect domestic productivity. An underlying assumption of this view is that foreign firms rely on imported inputs and restrict factor mobility domestically.

It must be noted that most empirical studies focused on the horizontal spillover effects whereby FDI firms increase the productivity of domestic firms within the same industry (see Blomström and Sjöholm (1999) and Keller and Yeaple (2003)). The importance of inter-industry or vertical spillovers is highlighted in the World Investment Report 2001 (World Bank, 2001). However, emphasis was on the backward linkages which were reported to be important means of diffusing knowledge, information and skills so as to increase the efficiency and growth potential of the host economies. Empirical evidence on vertical spillovers is limited. The findings of Driffield (2001), Driffield *et al* (2002) and Harris and Robinson (2004) suggest that inter-industry spillovers may be more important than intra-industry spillovers in the UK manufacturing sectors. However, the fact that these studies use industry level data there is a possibility that their estimates are subject to aggregation bias.

There is a relatively under-explored strand in the literature which focuses on the export spillover effects of FDI. Typically, the existing empirical studies analyze the export-enhancing role of FDI at the macroeconomic level. The presence of FDI firms can improve the international competitiveness of domestic firms by means of export information externalities, demonstration and competition effects. Aitken *et al* (1997) did the pioneering study on export-spillovers of FDI using a micro-oriented approach. Using plant level data in the Mexican manufacturing industry, they observed that the export activities of MNCs led to an increase the export propensities of domestic as well as foreign firms in the same sector. Bernard and Jensen (2004), on the other hand, found that there is no strong evidence of export spillovers, even though no distinction is made between domestic and FDI firms.

The role of R&D activities by MNCs has also been investigated in the process of export spillovers to domestically owned firms. The study of Barrios *et al* (2001) found evidence that the export and R&D activities of MNC firms failed to affect the likelihood of domestic firms in the

UK to become exporters although other foreign owned firms appeared to benefit from both activities when operating in the same sector. R&D activities undertaken by domestic firms themselves and the spillover effects from R&D by MNCs have a statistically significant impact on export propensities only to developed countries like the EU and OECD members. Interestingly, Greenaway *et al* (2004) found out that this controlling variable, together with the relative importance of MNC production in the domestic market, have a positive and significant correlation with the export propensities of domestic firms. However, the main channel for this spillover effect is through competition between the domestic and foreign owned firms rather than through export externalities.

Macroeconomic Studies

At the macro level, several studies have investigated the relationships between FDI and economic growth. In these studies, it has been difficult to exclude domestic investment and exports because doing so would not only result in model specification biases but also a lack of understanding of the functioning and structure of an open macroeconomy. However, the approaches used are numerous and are dependent on the underlying objective of the research. Earlier studies based their analysis of the long-run relationship between the variables by pooling the datasets. This methodology is used in Balasubramanyam *et al* (1996) and Borensztein *et al* (1998). However, exports have not been considered as an explanatory variable in their models. Balasubramanyam *et al* (1996) find that FDI is a more powerful driving force in the growth process than domestic investment. Borensztein *et al* (1998) observe that the presence of FDI crowds in domestic investment and, through the interaction with human capital, FDI has a greater growth-enhancing effect than domestic investment.

The macro impacts of FDI on economic growth appear to vary under specific conditions (de Gregorio, 1992). One such condition is the choice of trade policy regime which can influence the magnitudes and impacts of FDI on economic growth. There is empirical support for Bhagwati's (1973) hypothesis that countries that follow export-promotion development strategies are likely to attract higher levels of FDI and promote their utilization more effectively than countries that follow inward-oriented strategies. Indeed, Balasubramanyam *et al* (1996) find support of this hypothesis in a sample of forty-six countries over the 1970 to 1985 period. However, the use of cross-sectional datasets in their analysis implicitly assumes that the countries are homogeneous and consequently the results are subject to estimation bias. This methodology is further criticized given that it does not capture the dynamic effects which originate from a shift from the import-substitution to the export-promoting strategies.

As an alternative, it has been suggested that a systematic time-series analysis based on individual countries may provide more reliable estimates of the impacts of FDI on economic growth if the time span is long enough to capture the dynamic effects. Kohpaiboon (2002) undertakes such a study in the Thai economy over the period spanning 1970 to 1999 and concludes that Bhagwati's hypothesis indeed holds. However, for many developing countries, time-series studies proved difficult due to the lack of consistent datasets to investigate the long-run relationship between the variables.

Studies such as Blomström and Kokko (2003) reveal that an important condition for growth-enhancing effects of FDI is the existence of a human capital threshold as it determines the absorptive capacity of the host economy to assimilate and adapt to the technological and knowledge spillover effects from FDI (Van den Berg, 2001). Borensztein *et al* (1998) investigate this condition in a panel of sixty-nine developing countries spanning the period 1970 to 1989 and find evidence that indeed a minimum threshold of human capital is crucial for FDI to have a positive and significant impact on growth. Secondary schooling is used as a proxy for testing the threshold level. Xu (2000) provides further support of this finding and argues that a minimum human capital threshold is necessary to benefit from technology transfer but he also finds that most LDCs do not meet this requirement in the panel of 40 countries he studied.

The literature also highlights the importance of a development threshold necessary for host developing economies to maximize the positive externality effects of FDI. Blomström *et al* (1994) uncover that FDI has a larger growth-enhancing effect in countries with a higher level of per capita income in a cross-country analysis of 78 developing countries. However, Marino (2000) finds that the existence of a minimum developmental threshold is not an imperative condition for FDI to result in a positive growth effect. De Mello (1996, 1997, 1999) explains that this rationale is based on the fact that MNCs may represent technological enclaves in host countries leading to significant production and plant size differentials but limited productivity spillovers.

A relatively new strand in the empirical macro literature illustrates that FDI promotes economic growth through backward linkages in host countries that have sufficiently developed financial markets (Alfaro *et al*, 2010). While the study by Hermes and Lensink (2003) is consistent with this, Carkovic and Levine (2002) find that there is no strong significant evidence that a developed financial market is a precondition for FDI to have a positive impact on economic growth. In fact, in their study, FDI does not have a growth-enhancing effect.

The existence of diverging conclusions within the empirical literature can be partly attributed to the different econometric methodologies used in analyzing the FDI-growth nexus. De Mello (1999) argues that the estimation of time-series production functions based on the endogenous growth theory leads to simultaneity and omitted variable biases. To obtain consistent and efficient estimates, Gujarati (1995) suggests the use of two-stage least squares or Instrumental Variables. However, within the endogenous growth framework, it is difficult to find suitable Instrumental Variables which are correlated with FDI and not with economic growth. Hence, it is argued that the use of reduced-form models such as vector autoregression (VAR) may generate more suitable estimates in an endogenous context. Using panel causality tests and error correction models, Sooreea-Bheemul and Sooreea (2013) find positive pair-wise causality relations between FDI, exports and growth in a set of developing and emerging countries.

The use of cross-sectional analysis, too, has not been free from criticisms. Its implicit homogeneous assumption of common socio-economic, political, financial and institutional structures calls into question the reliability of the estimates in the FDI-growth relationship. The use of panel data analysis is expected to provide more efficient estimates as it captures the country-specific differences which are expected to evolve through time (De Mello, 1999). Nonetheless, one has to be careful because even though the inclusion of certain variables

improves the power of the tests, their significance would be questionable if they lead to misspecified models.

In order to reach efficient and consistent estimates, a correctly specified model should therefore accompany the use of an appropriate econometric methodology. While the Cobb-Douglas type production function forms the basis of the majority of the studies surveyed, there is no clear-cut rule on which dependent variable to use. Chen *et al* (1995) uses GNP in levels as the dependent variable and finds evidence of a significant growth-enhancing effect of FDI in China in the present of policy reforms. However, other researchers criticized this approach since it does not account for country size and ignores relative changes which are captured through growth rates. Hence, Balasubramanyam *et al* (1996) use the GDP growth rate as a proxy for growth while the studies of Borensztein *et al* (1998), De Mello (1996b) and Marino (2000) use the growth of per capita GDP as the dependent variable.

Similarly, much contention exists about which explanatory variables to employ. While most studies make use of the ratio of FDI to GDP (or GNP) as a proxy for FDI inflows, Chen *et al* (1995) use the lagged value of FDI to capture the dynamic relationship between the two variables. However, criticisms may arise if the number of lags is not systematically determined. In our study, we conduct sensitivity analysis with both FDI to GDP ratio and its lags but also argue that FDI stock might be more appropriate because of the spillover effects associated with it and its long run developmental implications.

It should be noted that most macroeconomic studies reveal a positive relationship between FDI and economic growth. However, there exist a few exceptions. Dutt (1997) finds that economic growth rates are significantly and negatively related to foreign capital stocks. De Mello (1996) also finds an insignificant impact of FDI on economic growth in Chile when the Instrument Variables technique is used. Carkovic and Levine (2002) criticize the fact that several existing macroeconomic studies "do not fully control for simultaneity bias, country specific effects and the routine use of lagged dependent variables in growth regressions." When correcting for these potential biases, they find that FDI does not lead to growth-enhancing effects.

In sum, both the micro and macro studies show that the potential impacts of FDI on economic growth are subject to a number of conditions including threshold levels, absorptive capacity of host countries, the technology gap and geographic proximities between domestic and foreign firms, trade policy regimes, sample period and size, estimation techniques and variables used. FDI can impact growth directly or indirectly. The indirect effects can be through technology and knowledge spillovers through domestic investment or through export spillovers especially if the FDI is export-led. However, overall, there is limited evidence of positive spillover effects. It would be interesting to analyze what kind of spillover effects FDI has generated in the Mauritian case. In the next section, we analyze the trends and patterns of FDI in Mauritius.

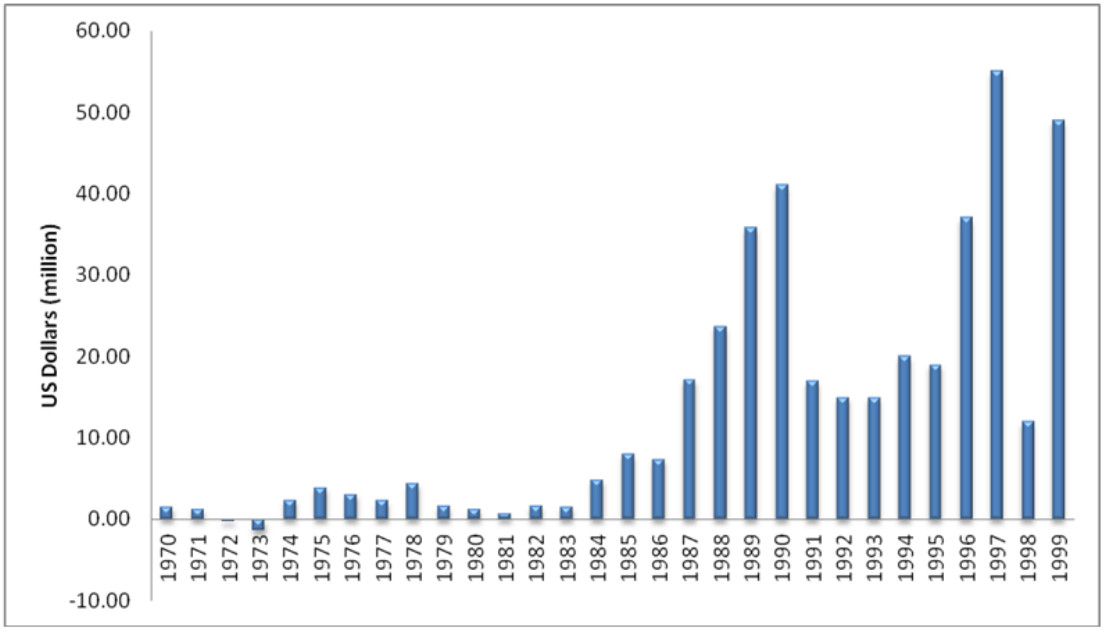
FDI TRENDS AND PATTERNS IN MAURITIUS

FDI Inflows

The pattern of FDI inflows in Mauritius during the EPZ success story is shown in Figure 2. Two conclusions clearly emerge from this chart. First, FDI inflows have been very modest during the 1970s and early 1980s before rising sharply in the late 1980s. Second, although FDI inflows have increased considerably in the post-1984 period, they have been quite erratic, reaching as high as $56 million in 1997 and dropping as low as $12.8 million in 1998. Overall, FDI inflows have rarely exceeded $30 million in any one year or 2 percent of GDP between 1970 and 1999 (World Bank's WDI, 2002).

During the 1970s, FDI inflows were not impressive in spite of the establishment of the EPZ and the numerous policy incentives given to foreign investors possibly because of the lagged effects of policy decisions and the relatively high volatility and uncertainty of the Mauritian economic growth (see Figure 6).

Figure 2. Foreign Direct Investment Inflows in Mauritius



Source: Compiled from World Development Indicators (2002)

In the early 1980s, the situation deteriorated due to adverse economic conditions leading to a further fall in FDI inflows from $1.2 million in 1980 to $0.7 million in 1981. The Mauritian Rupee had to be devaluated by 20 percent in 1981 in order to correct fundamental balance of payments disequilibrium. As a consequence of this policy decision, the economy's export competitiveness on the world market improved considerably. FDI inflows also more than doubled in 1982. Between 1983 and 1990, new policy incentives were given to compensate for the phasing out of the 10-year tax holiday which resulted in a phenomenal surge of FDI inflows

from $1.6 million in 1983 to $41 million in 1990. This increase in FDI inflows can also be attributed to the adoption of the IMF's Structural Adjustment Program (SAP) in 1983 which successfully improved the economy's foreign investment climate by eliminating trade and investment regulations, boosted foreign exchange earnings by promoting exports, and reduced government deficits through cuts in spending.

However, in the beginning of the 1990s, the growth of the EPZ sector became sluggish. In 1993, FDI inflows leveled off only at $14.7 million. The annual average inflows over the decade starting in 1990 were $27 million due to several large projects being implemented. In 1996, total FDI inflows increased to $36.7 million as a result of a one-off investment flow from Singapore for a racecourse project. A further increase of 45 percent was recorded in 1997, with an inflow amounting to $56.6 million of which $43 million represented the purchase of 20 percent share capital in the State Bank of Mauritius by Nedcor, a South African bank. In 1998, total FDI declined to $12.8 million but increased more than four fold in the following year due to two major foreign investments: one in a local commercial firm and the other in a tuna processing and caning firm.

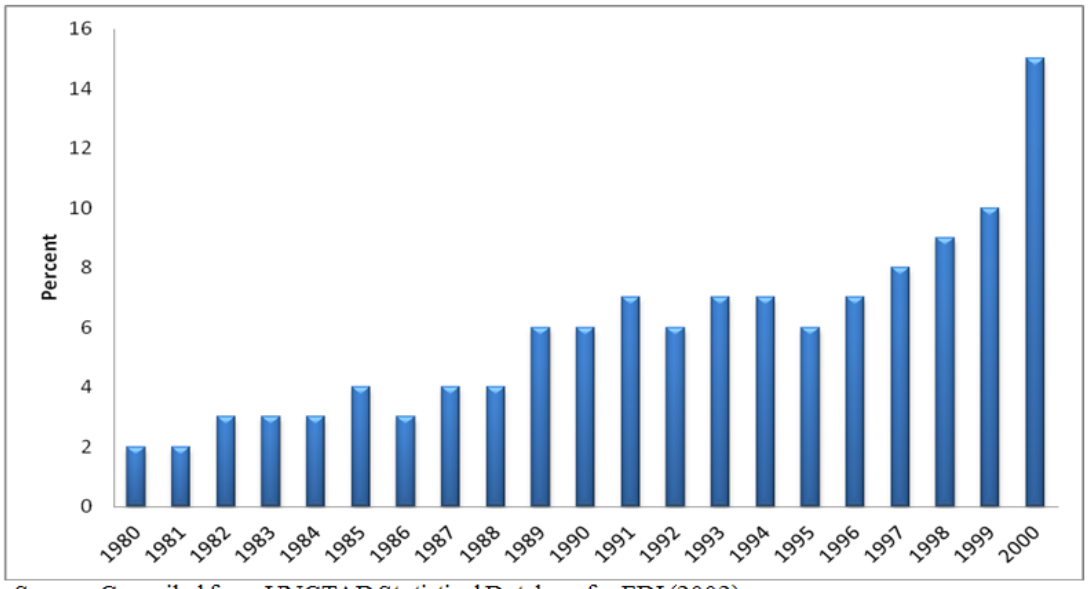
In an attempt to diversify the economy via the development of the Information and Communications Technology (ICT) sector, the Mauritian government liberalized the telecommunications sector through the privatization of the state monopoly Mauritius Telecom. In 2000, 40 percent of its shares were sold to France Telecom, leading to an unprecedented influx of FDI totaling to $276.8 million (not shown here). In 2001 and 2002, the FDI inflows slowed down to $32.1 million and $27.7 million respectively. For the next few years, the Mauritian government forecasted an increase in FDI inflows mainly due to the enactment of the African Growth and Opportunity Act (AGOA) in 2000 and the development of the ICT sector. Numerous fiscal and other incentives were being provided to meet this end.

Inward FDI Stock

The inflows of FDI provide a measure of the extent of FDI participation in the economy. A more appropriate measure of its economic significance and degree of economic integration is the ratio of inward FDI stock to GDP. This is because inflows are quite volatile and do not account for the size of the economy. FDI stock is a better indicator of the long term development potential of the economy because an increase in FDI stock suggests better access to new ideas, technologies and distributional facilities. Figure 3 reports the ratio of FDI stock to GDP starting from 1980 only (due to unavailability of data for earlier years).

Unlike FDI inflows (as shown in Figure 2), the pattern of FDI stock to GDP is quite different. The share of inward FDI stock to GDP has been rising continually and strongly, increasing by more than sevenfold over the 1980-2000 period. This indicates the possibility of an increase in technical progress in the domestic economy. From 1980 to 1988, this ratio was quite stable, fluctuating between 2 and 4 percent but then rose to 6 to 7 percent between 1989 and 1995. After 1996, a sharp increase is observed as the share of FDI stock to GDP more than doubled over the next four years.

Figure 3. Share of Inward FDI Stock to GDP



Source: Compiled from UNCTAD Statistical Database for FDI (2002)

Did Mauritius Lose its Competitiveness as an FDI Destination?

To better understand the ultimate impacts of FDI on the Mauritian economy, it is important to examine its sectoral breakdown. The sectoral distribution of FDI shown in Tables 1 and 2 reflects the diversification strategy adopted by the Mauritian government to develop the island.

Table 1. Sectoral Distribution of Foreign Direct Investment Inflows in Mauritius
(*Mauritian Rupees: Million*)

Sector	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
EPZ	270	130	203	92	41	245	51	0	27	300	8
Tourism	152	68	8	152	129	70	35	20	75	27	10
Banking	0	51	3	0	0	0	55	1122	117	215	0
Telecom	0	0	0	0	0	0	0	0	0	0	7204
Other	187	48	16	27	190	10	517	22	73	701	43
Total	609	297	230	271	360	325	658	1164	292	1243	7265

Source: Compiled from Central Statistical Office, Mauritius

Table 2. Sectoral Distribution of Foreign Direct Investment in Mauritius
(*Percentage*)

Sector	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
EPZ	44.3	43.8	88.3	33.9	11.4	75.4	7.8	0.0	9.2	24.1	0.1
Tourism	25.0	22.9	3.5	56.1	35.8	21.5	5.3	1.7	25.7	2.2	0.1
Banking	0.0	17.2	1.3	0.0	0.0	0.0	8.4	96.4	40.1	17.3	0.0
Telecom	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	99.2
Other	30.7	16.1	6.9	10.0	52.8	3.1	78.5	1.9	25.0	56.4	0.6
Total	100	100	100	100	100	100	100	100	100	100	100

Source: Compiled from Central Statistical Office, Mauritius

Tables 1 and 2 indicate a clear structural change in the Mauritian economy between 1990 and 2000. In the early 1990s, the EPZ sector had the most FDI, both in Rupee terms as well as a percentage of total FDI inflows in the country. FDI in tourism was the second largest type of FDI inflows. Over time, however, while both the tourism and EPZ sectors experienced a decline in FDI, the EPZ sector's FDI declined much more than the tourism sector's FDI. In the late 1990s, FDI switched away from EPZ and tourism and into the service sector – particularly in the banking and telecommunications sector. In 2000, FDI into telecommunications accounted for more 99.2 percent of total FDI inflows.

The underlying economic argument explaining the structural transformation of the Mauritian economy lies in the erosion of the initial package of incentives given to the EPZ sector. As a consequence, this sector lost its attractiveness to foreign investors. Rising labor cost conditions, stabilizing labor productivity (see Figure 4), the erosion of the preferential access to the European and US markets, and strong competition from regional competitors in the textile and clothing manufacturing industries forced the Mauritian government to diversify the economy towards a higher value added service sector.

In the textile and clothing industry, foreign workers play an important role in raising productivity. They speed up the production line of the whole group as they are usually paid piece-meal. Overall, there exists a strong positive association between the share of FDI stock to GDP and labor productivity as revealed by an estimated correlation coefficient of 0.86 in the EPZ sector and 0.91 in the whole economy. However, according to the International Labor Organization (ILO, 1997), labor productivity in the EPZ sector of Mauritius remains lower than other competing countries because of the high rate of labor turnover and poor work discipline, inadequate training, and the slow progress in the modernization of obsolete production techniques.

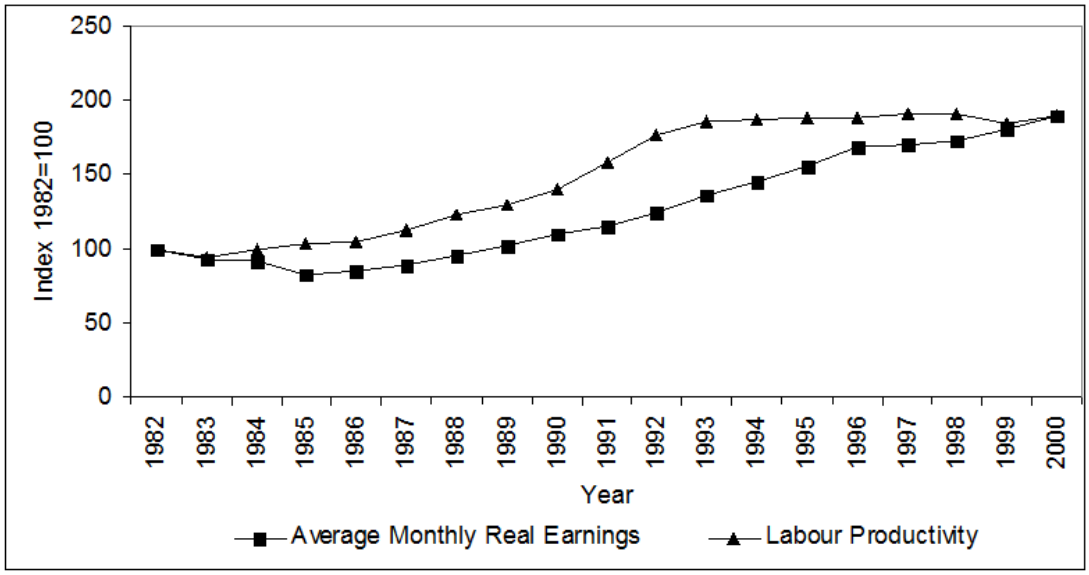
In the EPZ sector, changes in labor productivity act as a wage determinant. As real GDP per worker increases, the economy moves up its development path causing an increase in earnings. In the Memorandum on Wages Policy (2004), a publication by the Mauritius Employers' Federation, the Mauritian economy has been portrayed as a victim of its own success; while the economy is developing, it is also losing its edge due to rising labor cost.

Figure 4 shows that the growth rate in real earnings and the growth rate in labor productivity seem to have eventually converged by the year 2000. If the earnings index overtakes the labor productivity index it would reduce the competitiveness of the economy and possibly deter foreign direct investors from investing. Indeed, Lall (1999) observed that "the competitive advantage given by low wages for unskilled or semi-skilled workers should certainly be exploited, but it is only a starting point. Such an advantage is temporary and evanescent; it cannot support rising wages or better living standards unless skills and technologies are upgraded to allow labor to be used in more productive, higher value-added activities."

This partially explains why Mauritius is facing difficulty competing with countries like Bangladesh, China, and Vietnam in the production of T-shirts and moderate quality garments for basic mass markets. In fact, Madagascar, Mozambique and other SADC countries are more competitive locations and this is causing an exodus of FDI from Mauritius into these destinations. In fact, even some Mauritian textile companies have relocated to these countries.

In the initial years of industrialization the Mauritian economy appeared to have all the necessary assets to attract FDI: a well-educated workforce, social and political stability, global economic integration through the WTO and regional trade agreements with Southern African Development Community (SADC) and Common Market for Eastern and Southern Africa (COMESA), policy incentives for foreign investment and export, a dynamic private sector plus a strong institutional and legal framework. However, over the 1990s the average FDI inflows have been high only because of the large one-off investment projects.

Figure 4. Labor Productivity and Earnings in EPZ Sector, 1982-2000



Source: Compiled from Central Statistical Office, Mauritius

The Ministry of Economic Development, Financial Services and Corporate Affairs identified a number of reasons that explains the Mauritian economy's weakness in attracting FDI. First, even though the government introduced numerous and highly differentiated investment incentives schemes to attract FDI, their promotion strategy has not been efficiently managed. Up until recently, several independent agencies carried out their own investment promotion which led to distortions in the market and sent conflicting signals about the sectors and activities that the government was keen to promote. Second, the processing and approval of applications for FDI projects takes between 9 to 32 weeks in Mauritius in contrast to 3.5 weeks in Singapore, 4 weeks in Sri Lanka and 4.5 weeks in Thailand. This bureaucratic problem is more pronounced within the EPZ sector. However, the establishment of the Board of Investment (BOI) in 2001, under the Investment Promotion Act 2000, has partially helped to alleviate this problem by being a responsible government authority for promoting and facilitating FDI in Mauritius. Finally, although labor productivity in Mauritius increased over time, it was not enough to match the rate at which wage rate increased. Ancharaz (2003) shows that labor shortages have caused wages to go up much more than labor productivity in the EPZ sector. Moreover, many EPZ enterprises have been unable to adopt more capital-intensive and

technologically superior production methods (Ancharaz, 2003). In general, capital productivity for the whole economy registered a declining trend between 1988 and 2000 (see Table 3).

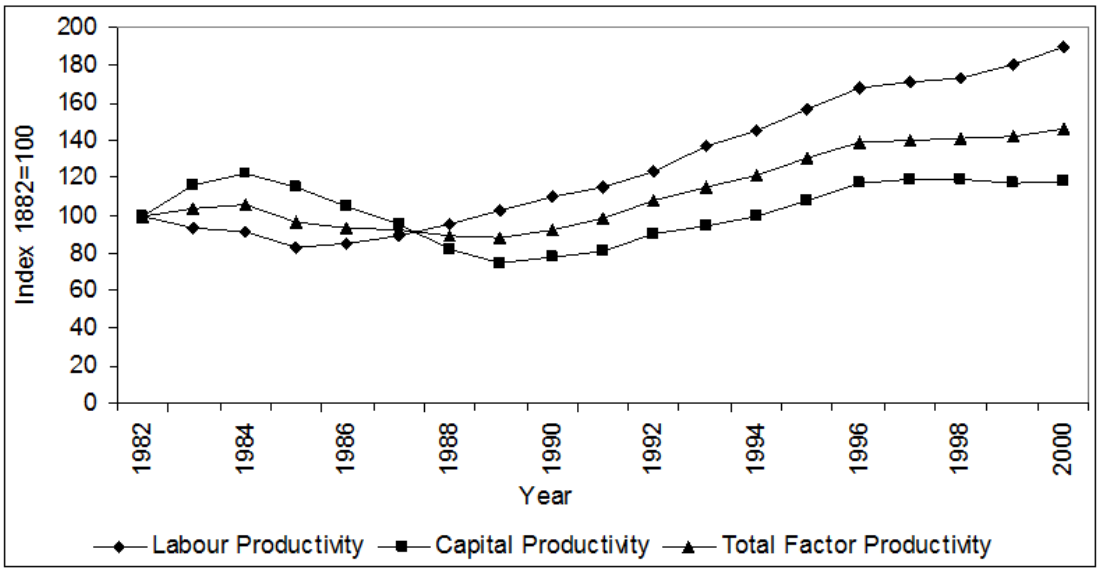
While labor and capital productivities account for only individual factor inputs, total factor productivity (TFP) estimates the contribution to output per unit of combined capital and labor units as well as other qualitative factors, for instance, effective management, efficient work performance and training programs. The average TFP growth for the total economy during 1982 and 2000 was 0.6 percent per annum (see Table 4). However, the growth of TFP in the EPZ sector was much higher, at 2.2 percent (see Figure 5). Since most the EPZ sector was FDI-driven and also geared solely for export, it is very likely that FDI in the EPZ sector was largely responsible for the overall growth of the economy which was export-oriented. Moreover, the fact that the EPZ sector productivity rose from 1989 onwards, it indicates that productivity in Mauritius was subject to factors (other than capital and labor inputs) that are endogenous to the production process.

Table 3. Labor, Capital and Total Factor Productivity in Mauritius (Whole Economy)

Year	Labor Productivity		Capital Productivity		Total Factor Productivity	
	Index	Growth	Index	Growth	Index	Growth
1982	100.0		100.0		100.0	
1983	96.0	-4.0	99.1	-0.9	97.5	-2.5
1984	95.5	-0.5	101.8	2.7	98.6	1.1
1985	95.8	0.3	105.7	3.9	100.8	2.2
1986	96.6	0.9	109.9	4.0	103.5	2.7
1987	98.5	1.9	112.2	2.1	105.6	2.0
1988	101.0	2.5	110.8	-1.2	106.0	0.4
1989	102.4	1.4	104.3	-5.9	103.4	-2.5
1990	106.8	4.4	102.0	-2.2	104.2	0.8
1991	109.4	2.4	98.0	-3.9	103.1	-1.0
1992	114.6	4.8	96.7	-1.3	104.4	1.2
1993	118.0	2.9	94.1	-2.6	104.0	-0.3
1994	121.7	3.1	91.2	-3.2	103.5	-0.5
1995	127.3	4.6	91.2	0.0	104.9	1.4
1996	134.2	5.4	90.7	-0.5	106.2	1.2
1997	140.0	4.3	89.9	-0.9	106.8	0.6
1998	146.0	4.3	90.3	0.4	108.7	1.8
1999	148.1	1.4	86.7	-4.0	107.0	-1.6
2000	160.2	8.2	90.1	3.9	112.0	4.7
2001	168.2	5.0	91.0	1.0	113.3	1.2

Source: Compiled from Central Statistical Office, Mauritius

Figure 5. Trends in EPZ Sector Productivity, 1982-2000



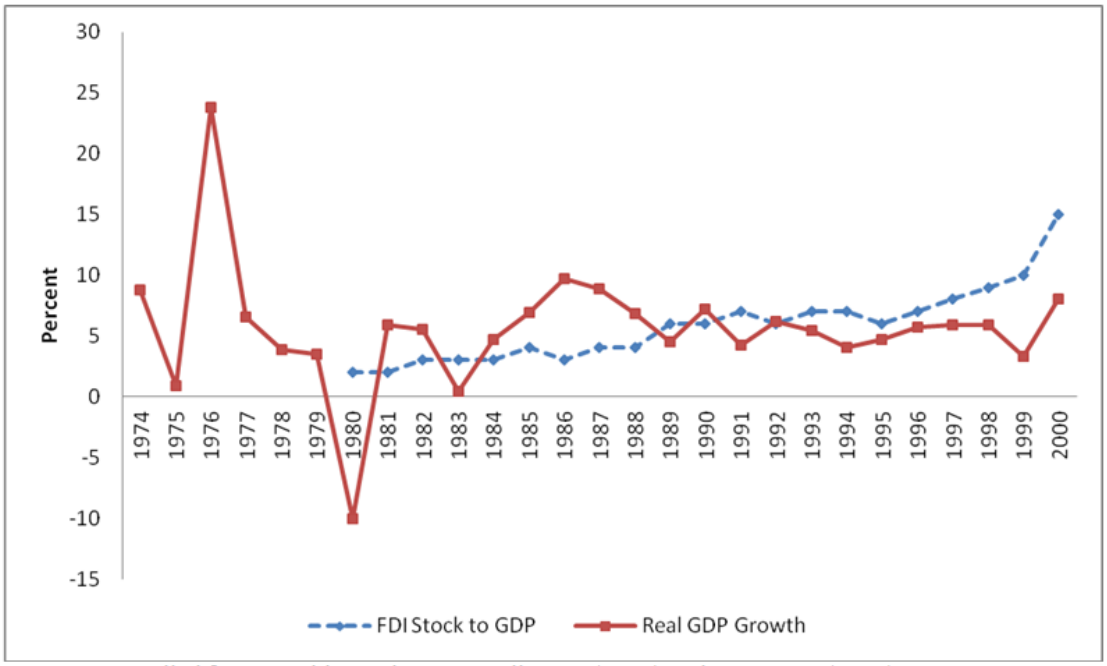
Source: Compiled from Central Statistical Office, Mauritius

The theoretical literature supports the view that FDI endogenously increases productivity growth by means of technical and knowledge spillover effects which can have a permanent impact on economic growth of host countries. In order to enhance the diffusion of technology to domestic firms, the government of Mauritius, with the support of the World Bank, set up the Technology Diffusion Scheme (TDS) in 1994. Its main objectives were to facilitate access to technology in order to improve productivity, quality, design and response time, and to assist in the diversification of export production. An evaluation of the scheme by Biggs (1999) shows that despite the initial problems in design and implementation the scheme had a positive and significant impact on TDS-assisted firms as considerable increases in both sales and exports were recorded and the average increase in exports was more than twice the national average.

ANALYSIS OF THE IMPACTS OF FDI IN MAURITIUS

This section conducts an empirical analysis of the effects of FDI on economic growth in Mauritius. Our analysis in the previous section suggests that FDI might have crowded-in domestic investment as well as created positive spillovers for exports and through these channels it might have been responsible for the sustained economic growth in the 1980s and 1990s. Figure 6 shows that the share of FDI stock in GDP has averaged around 5.8 percent between 1980 and 2000 (data prior to 1980 is not available). More importantly, it has been trending upward since the 1980s (see Figure 6). Real GDP growth, on the other hand, has been relatively volatile in Mauritius with wild swings in the 1970s before stabilizing in the 1990s.

Figure 6. Real GDP growth and Share of FDI Stock in GDP



Source: Compiled from World Development Indicators (2002) and UNCTAD (2002)

In this study we test for the impact of FDI on economic growth in Mauritius using an augmented Cobb-Douglas production function based on Balasubramanyam *et al* (1996):

$$Y = f(L, K, F, X) \qquad (1)$$

Y represents real GDP as a function of labor inputs (L), domestic capital stock (K), foreign capital stock (F) and exports (X). Exports are introduced in the model following the large literature on the export-led growth hypothesis and because exports account for more than 60 percent of GDP in Mauritius. Taking logs and differencing, we obtain the following growth equation:

$$g_t = \alpha + \beta GL_t + \gamma DIG_t + \phi FDIG_t + \psi GX_t + \varepsilon_t \qquad (2)$$

where g_t represents the growth rate of real GDP at time t, GL represents the growth rate of the labor force, GX represents the growth rate of exports and ε_t is the random error term. Because it was difficult to obtain data on domestic capital stock, we use the share of domestic investment to GDP (DIG) as the proxy for the growth rate of domestic capital stock. We account for foreign capital stocks in two ways. First, we use the share of FDI inflows in GDP ($FDIG$) as the proxy for the growth rate of foreign capital stock. Secondly, as we identified earlier in this study that FDI inflows were more erratic in Mauritius while FDI stocks were sustained over the years and they might have important spillover effects and long term developmental implications, we re-specify equation (2) in terms of the growth rate of FDI stock ($GFDIS$):

$$g_t = \alpha + \beta GL_t + \gamma DIG_t + \phi GFDIS_t + \psi GX_t + \varepsilon_t \qquad (3)$$

In the above equations, the coefficients represent the output elasticities with respect to the factor inputs. In the empirical analysis, our main focus in on the parameter ϕ which captures the impact of FDI on economic growth. The dataset for FDI as a share of GDP spans the 1974-2000 period. However, the dataset for FDI stock could be available starting in 1980 only. Hence we need to interpret the Ordinary Least Squares regression results reported in Table 4 with caution. Before estimating the equations, each of the variables was tested for unit roots and found to be stationary.

Table 4. Estimates of Augmented Growth Equations
Dependent variable: *g*

Independent variables	**Column I**	**Column II**	**Column III**	**Column IV**	**Column V**	**Column VI**
FDIG	0.841	0.887	0.684			
	(1.071)	(1.037)	(0.752)			
DIG	0.265^{+}	0.263	0.435*	0.123	0.135^{+}	0.134^{+}
	(1.944)	(1.532)	(2.112)	(1.404)	(1.741)	(1.601)
GX	0.293*	0.296*	0.354*	0.205*	0.277*	0.280*
	(3.800)	(3.603)	(3.919)	(3.991)	(6.259)	(6.247)
GL	2.506^{+}	2.353	1.126	0.853	-0.456	-0.818
	(1.829)	(1.479)	(0.628)	(0.946)	(-0.575)	(-0.931)
FDIG(-1)		-0.440	-1.231			
		(-0.193)	(-0.451)			
FDIG(-2)			-1.853			
			(-0.750)			
GFDIS				0.035^{+}	0.049*	0.055*
				(1.646)	(2.798)	(2.879)
GFDIS(-1)					-0.024	-0.037
					(-0.862)	(-0.970)
GFDIS(-2)						0.025
						(0.729)
N	31	30	29	20	19	18
R-squared	0.428	0.400	0.454	0.613	0.808	0.834
R-bar squared	0.340	0.275	0.306	0.510	0.734	0.744
Diagnostic Tests (LM Version)						
Serial Correlation	0.228	0.219	1.065	0.176	2.081	1.649
	[0.632]	[0.639]	[0.302]	[0.674]	[0.149]	[0.199]
Functional form	8.272	10.302	6.260	0.233	2.423	1.387
	[0.004]	[0.001]	[0.012]	[0.629]	[0.120]	[0.239]
Normality	39.647	36.760	16.735	0.103	0.591	0.823
	[0.000]	[0.000]	[0.000]	[0.950]	[0.744]	[0.662]
Heteroskedasticity	0.581	0.502	0.230	3.701	3.609	3.200
	[0.446]	[0.479]	[0.632]	[0.054]	[0.057]	[0.074]

Notes: The *t*-ratios are given in ( ) and the *p*-values in the diagnosis tests are given in [ ]. * and $^{+}$ represent significance at the 5 and 10 percent levels respectively

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The results in columns I and IV are based on equations (2) and (3) respectively. Columns II, III, V and VI report the findings when these equations control for the lagged effects of FDI to account for possible dynamic effects. Given that the time-series windows are relatively small, the lag length did not exceed two years. The diagnostic test results are also reported. The findings reveal that while the coefficients of the share of FDI to GDP (i.e. *FDIG*) are statistically insignificant, the coefficients of the growth rate of FDI stock (*GFDIS*) are positive and significant. The high volatility in FDI inflows explains the differences in these results. Overall, the results indicate that FDI stock has a positive impact on economic growth in Mauritius, consistent with the findings of Blin and Ouattara (2009). Table 4 also points to two other important results: the role of domestic investment and the role of exports in the economic growth process of Mauritius. Domestic investment has a positive, albeit weak, impact on growth, again consistent with the findings of Blin and Ouattara (2009). Our results also indicate that exports are the prime driving force of growth of the Mauritian economy.

Although more systematic firm-level research is needed to assess the impact of FDI on domestic investment and exports in the Mauritian context, it is important to note that FDI resulted in the creation of many small- and medium-sized enterprises (SMEs) in the EPZ sector and the tourism industry. FDI in the textile and clothing industry created a network of SMEs whose main responsibility was to lend support to the large foreign investors. Local firms were commissioned to work on a contract basis to meet the large demand for shirt orders, whereby their tasks in the supply chain were to cut, make up and trim the pieces. Reportedly, this is how the smaller domestic firms learnt about the design and quality that were in demand on the international market.

Managerial expertise was hired from the foreign firms in order to ensure that quality and standards were maintained. It soon appeared that the Mauritians had a sharp learning curve, the workers and managers quickly mastered the manufacturing and managerial techniques. As a result, domestic investment started to crowd-in. Local firms even bought out foreign firms and partnered in joint-venture collaborations. Some started to set up their own businesses. FDI in the EPZ sector also allowed domestic firms to benefit from easier access to information regarding the international distribution and marketing networks. Foreign subsidiaries had better knowledge of consumer taste, potential competitors, regulations and the market structure of targeted markets. This privileged information spilled over to the indigenous firms. However, the foreign firms had higher costs mainly because their managers were entitled to perks which were not customary to Mauritian managers. On the other hand, domestic firms were able to inspire confidence in the local financial institutions about their prospects and were able to receive credit facilities to start up new businesses or upgrade to ownership positions.

During the 1980s, the presumed crowding-in effect of domestic investment in the EPZ sector was mainly the result of the (i) training of labor at the production and managerial levels, (ii) demonstrations effects as local firms were able to imitate the designs of foreign firms or partners in joint ventures, and (iii) forward linkage effects as the quality and standard of products improved. The demonstration effect, on the other hand, enhanced export competitiveness of the domestic firms. However, the competition effects were not significant given that FDI was not

market-seeking; backward linkage effects too were minimal as the industry relied mainly on imported raw materials.

In the 1990s, the situation changed quite drastically. From 1992 to 2000, there was an estimated negative correlation of –0.35 between FDI and domestic investment and a correlation of –0.11 between FDI and total investment in the EPZ sector (based on authors' calculations not reported here for the sake of space). However, it should be noted that this negative relationship could be the result of the high volatility of FDI (domestic investment followed essentially an upward trend over this period).

The strongest result of our estimation is that exports are the most important factor in the Mauritian economic success story. Since FDI was mostly in the EPZ sector and the EPZ firms made products exclusively for exports, and exports are the driving force of economic growth in Mauritius, we can infer that FDI played an important role for the promotion of export and growth. Testing of each of these hypotheses would be an agenda of future research; however, Ancharaz's (2003) study also confirms that FDI has been instrumental in the export development of Mauritius.

One of the major contributors of the success of exports to growth was the preferential access Mauritius had to the EU market (under the Sugar Protocol of the Lomé Convention and other preferential textile agreements) and to the U.S. through the Multi-Fibre Agreement (MFA). Moreover, in order to promote FDI-led exports and the competitiveness of domestic firms, the government of Mauritius formed several institutions during the 1980s and 1990s. Three of these were the Mauritius Industrial Development Authority (MIDA), the Export Processing Zone Development Authority (EPZDA), and the Small and Medium Industry Development Organization (SMIDO). The MIDA, established in 1985, is responsible for the promotion of exports of goods and services, advising the government on export development policies and serving as a liaison with exporters to have a better understanding of their needs. It also conducts market development activities and assists in capacity building of exporters. The EPZDA, established in 1990, is responsible for assisting manufacturers in supply chain management, enhancing backward linkages and facilitating the clustering of enterprises. Besides, its role is also to enable EPZ firms to take advantage of higher levels of technology via computerized production equipment and the use of Information Technology in order to become more competent in export-oriented activities. The SMIDO, established in 1993, assists small entrepreneurs in setting up their businesses as well as provides relevant training and advisory services. It also helps in developing their products and exports possibilities.

The role of these institutions has become more significant as the preferential access to the EU and U.S. markets disappeared over time (The Lomé Convention expired in 2000 and the MFA phased out in 2005). However, the U.S.'s Africa Growth and Opportunities Act (AGOA) of 2000 helped the Mauritian clothing and textile industry by providing an average of 17.5 percent customs duty advantage relative to non-African suppliers, subject to strict adherence to rules of origin.

The degree of success of export-led FDI in Mauritius has been criticized for its failure to develop backward linkages in the EPZ sector. This is mainly because demand for intermediate inputs is import-based: Mauritius imports most of its machinery, raw materials, equipment and

semi finished products which are exempt from import duty. In addition, the fact that FDI in Mauritius during the boom years was mainly in the EPZ sector (with a focus on wearing apparels), it limited the prospect of spillover effects to enable a vertical diversification strategy. Malaysia, Taiwan and Hong-Kong have been more successful in adopting such a strategy by moving away from clothing towards the production and assembly of electronic goods. Production of these manufacturing goods is skilled-based and has higher value added content.

POLICY LESSONS AND RECOMMENDATIONS

Lessons

This study has examined the role of FDI in the economic growth success period of Mauritius. It has also examined the role of domestic investment and exports in the growth process. The results indicate that FDI stock, as opposed to FDI inflows, had the most profound contribution to the Mauritian economy. This implies that the accumulation of FDI over time did serve as a powerful mechanism to promote growth through spillovers, technology and knowledge transfers. Moreover, our study shows that since FDI was mostly in the EPZ sector where firms made products (clothing and textiles) exclusively for exports, and exports are the driving force of economic growth in Mauritius, we can conclude that FDI played a crucial role in the promotion of exports and growth.

It is also important to point out that Mauritius emerged as a success story because there was a healthy public-private partnership. The government created a host of institutions such as the MIDA, EPZDA and SMIDO that endorsed Mauritius as an FDI destination, allowed domestic firms and foreign investors to mutually benefit from another, and promoted Mauritian products in international markets. Another key piece to the Mauritian economic miracle is the package of fiscal and financial incentives that the Mauritian government devised to lure export-oriented foreign direct investors to the country. Mauritius also negotiated and benefited from preferential access to EU and U.S. markets for its products.

However, we also observed that, over time, the pattern of FDI in Mauritius has switched away from the EPZ and tourism sectors to the service sectors, in particular, the telecommunications industry. EPZ foreign investors have moved to lower cost locations because of rising labor cost in Mauritius. Besides, there had been massive one-off foreign investments in several years and these created spikes in FDI inflows.

Recommendations

Going forward, Mauritius needs to adopt a vertical diversification strategy towards higher value added products to increase the export productivity of foreign and indigenous firms. In the EPZ sector, this means integrating the textile and clothing industry vertically backward (for instance, by going into yarn spinning which is capital intensive) in order to create backward linkages and to benefit from the new trade agreements under the U.S.'s Africa Growth and Opportunities Act.

In recent years attention has been geared towards information and communications technology (ICT), financial services, offshore banking, freeport, and FDI in higher education. Both the government and the business community have recognized the structural change in Mauritius and that the country needs to embark on its second phase of industrialization. In order to maximize the benefit from FDI and its linkage and spillover effects, the institutional framework is essential. Besides, the opportunities available within regional alliances are non-negligible and should be properly tapped. In this regard, to enable Mauritius to benefit once again from FDI, policy should be designed along the guidelines outlined below. These policy recommendations have been grouped in four broad categories as follows:

Cost and Productivity

Since an increase in labor costs, with unmatched levels of productivity, has been identified as the main reason for the drop in FDI in some years, policies should be devised to enhance labor productivity. In the short-term, this can be increased through the training of the semi-skilled work-force via short and intensive workshops. A longer term solution would involve the introduction of more systematic skills development programs in the education curriculum, particularly at the secondary school level. Labor laws should be made more flexible to increase mobility across sectors. For instance, workers should not lose out on pension schemes when shifting to a more dynamic sector.

The ICT sector has a relatively small pool of skilled IT professionals. The Ministry of Education and Scientific Research and the Ministry of IT and Telecommunications are working in close collaboration to build an IT literate workforce. In primary schools, IT is introduced both as a subject and as a tool for teaching. However, this project has a long term gestation period. A wider scale implementation, though costly, is required. In this capacity building process, the University of Mauritius, the University of Technology, the Industrial and Vocational Training Board and private IT training centers should all be participating actively. In the short run, Mauritius may need to rely on imported professionals for the ICT sector. However, policy makers have to ensure that the sector does not become over reliant on foreign labor.

With the advent of the ICT sector, Mauritius needs to lower telecommunication costs for both national and international services as well as for internet usage. Further liberalization of the telecom sector will help the ICT sector become internationally competitive and cost efficient.

The Mauritian diaspora represents an important pool of expertise and capital which can be imported back or tapped with the right incentives. Indeed, several countries employed this strategy of 'returned brain-drain' to develop their IT industry (for instance, India, China, Singapore and Malaysia).

Synergies at the Domestic, Regional and International Levels

Lessons should be learnt from the EPZ experience that the phasing out of the tax holidays led to an exodus of FDI firms and hence the importance of domestic investors should not be overlooked. Joint ventures or more commitment between domestic firms and foreign investors can bring out important synergies and help avoid Ireland's mistake where FDI firms benefitted at

the expense of the domestic firms (Alfaro *et al*, 2005). Subcontracting relationships of FDI firms and the SMEs will consolidate linkage effects.

To avoid one-off investments, Mauritius should encourage major international players with a long-term interest as they are more likely to bring in more stable returns, create better linkage effects and promote knowledge and technological transfer. In the ICT sector, big companies such as Infosys Limited of India, Outremer Telecom and Teleforma from the U.S. have started operations in Mauritius. More such companies should be attracted.

A new trend that has started in Mauritius is FDI in higher education. Foreign universities, especially from the U.K. and India, have started investing in Mauritius because there is a large pool of students who cannot afford the costly education in advanced countries and Mauritius is relatively cheaper alternative to get a quality education. FDI in education can have a direct impact on growth as well as positive spillovers on other sectors of the economy.

Mauritius should leverage its membership in various regional organizations such as Common Market for Eastern and Southern Africa (COMESA), Southern African Development Community (SADC), Indian Ocean Commission (IOC) and Indian Ocean Rim-Association for Regional Cooperation (IOR-ARC) to promote itself not only as an FDI destination but also to promote its exports to the member countries.

Institutional Framework

The bureaucratic procedures for attracting FDI to Mauritius have discouraged foreign direct investors. The lack of selection criteria for FDI programs has led to the wearisome 'watch and wait' approach for investors. It is only recently that the Board of Investment (BOI), the national investment promotion agency of Mauritius, was created in order to simplify and improve upon the procedures for foreign investors to invest in Mauritius. Yet, more transparency is needed in terms of the selection criteria of new FDI programs and less time is required for the approval of FDI projects.

Recent studies by Alguacil *et al* (2011) suggest that host country governments should develop policies that not only promote inward FDI but also improve their political and economic framework. Subramaniam (2001) argues that Mauritius has been successful because it has a 'deep' set of institutions that other sub-Saharan African nations lack. Hence, it is important for Mauritius to continue maintaining a high level of institutional infrastructure as it embarks on its second phase of industrialization. This includes a sound political system, a democratic society and a high protection against expropriation. It should continue to maintain a system where the business community is assured that there will be a sound continuity of policies irrespective of which political party is in power.

Fiscal, Financial and Other Incentives

For Mauritius to stand out as a competitor in attracting FDI in the African region, it needs to develop a greater awareness and aggressively promote its fiscal, financial and other incentives to the international business community. It needs to maintain a sound macroeconomic climate with price stability, trade and investment openness, competitive interest rate structure, good and

reliable banking and credit institutions, competitive tax advantages and a transparent and vibrant stock market enabling fair and international trading. A recent study by Agatheea *et al* (2012) indicates that Initial Public Offerings (IPOs) on the Stock exchange of Mauritius are underpriced. Such market misallocations need to be corrected.

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