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THE UNWANTED EFFECTS OF INTERNATIONAL FINANCIAL REPORTING STANDARDS (IFRS) ADOPTION ON INTERNATIONAL TRADE AND INVESTMENTS IN DEVELOPING COUNTRIES

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ABSTRACT

The year 2010 witnessed two major business phenomena in the world. First, an unprecedented degree of consensus among more than 120 countries to require or permit the use of International Financial Reporting Standards (IFRS) in their jurisdictions and; second, for the first time in history Foreign Direct Investment (FDI)inflows to developing countries reached a half of that of global investment, and are further expected to lift up to over $2 trillion in 2012. When the International Organization of Securities Exchange Commissions (IOSCO) ratified International Financial Reporting Standards (IFRS) in 2002, FDI inflows started to grow from $0.6 trillion to $1 trillion in 2005. Furthermore, when the European Union (EU) required its member to use IFRS in 2005, FDI inflows has doubled and reached its peak in 2007 at more than $2 trillion. The global trade also experienced the same increasing trend. Assuming that adopting IFRS promotes higher comparability and transparency of accounting information, the bigger question is that does IFRS adoption affect developing countries' FDI inflows and values of international trade?

To answer this question, we examine the effects of IFRS adoption on international trade and FDI inflows in developing countries. After controlling generally accepted determinants of FDI inflows and international trade, we find a contradictory fact that developing countries adopting IFRS are unlikely to experience higher FDI inflows and international trade.

INTRODUCTION

Recently, 123 countries has either required or permitted the use of International Financial Reporting Standards (IFRS) in their jurisdictions, indicating that the acceptance of IFRS has been growing substantially (IASPlus, 2010). It appears that the global convergence of national accounting standards and International Accounting Standards (IAS, superseded by IFRS) has been successfully achieved (IASB, 2007). The International Accounting Standards Board (IASB) itself maintains that IFRS is perceived as "a single set of high-quality, understandable and enforceable accounting standards that require high quality, transparent and comparable information in financial statements and other financial reporting to help participants in the world's capital markets and other users make economic decisions" (IASB, 2007, p. 4). As a

result of this rapid diffusion of IFRS, it is expected that countries adopting IFRS would have higher degree of transparency and comparability of financial reporting, would decrease asymmetric information and at the end would attract more investment and foster higher international trade.

Japanese FDI provides a perfect example on how international investment, and to some extent international trade are always searching for the best place where it is valued the most. In 1980s it was mainly allocated to North America and Europe, and shifted to East Asia in the late 1980s, then distributed to ASEAN in 1990s, and finally poured to China. The movement of Japanese FDI suggests that international trade and investment are always looking for trade and investment friendly factors, such as pro-globalization policies, robust economic growth, lower business costs, political and social stability, and sufficient infrastructure. However, after countries` efforts of creating trade and FDI-friendly features are entwined each other and saturated with no direct significant positive outcome, these features eventually become only prerequisites instead of advantages of having more investment and trade. In other words, possessing these factors does not necessarily result in better international trade and investment performances. Consequently, countries need to find additional factors that could significantly attract investment and trade and it might be the adoption of IFRS.

The IASB contends that the acceptance of IFRS represents unification of business language and institutions, which increase the quality of economic information that could help investors, firms, and governments to make better economic decisions. Reasonably, countries turn to IFRS to attract more international investment and trade. Unfortunately, not only adopting IFRS requires high costs of newly established institutions, regulations, infrastructure, and the acceptance that national standards are usurped by international standards, but also although the arguments of adoption of IFRS results in economic benefits are strong and reasonable, little supporting empirical evidence has been found. Botswana, Haiti, Nepal, Panama, Papua New Guinea, Tajikistan, and Venezuela are among countries that substantially adopt IFRS yet have not able to obtain desirable economic benefits from the adoption (Lasmin, 2011). This phenomenon raises an important question: Do countries adopting IFRS experience higher value of international trade and attract higher value of investment? Therefore, it is important to examine whether IFRS adoption has been playing catalytic roles in promoting international investments and trade in developing countries.

The significance of this study is that it is expected to be able to confirm the importance IFRS adoption on Foreign Direct Investments (FDI) inflows and International trade. In this regard, this study could clarify whether single set of accounting standards fits all countries. In addition, it will add depth to current literature because bringing IFRS into FDI and international trade`s country-level analysis is a relatively new approach to understand the impact of standardization and globalization of international accounting standards and so far, to the best of our knowledge, there is no study on the effects of IFRS adoption in developing countries from macroeconomic perspective. Finally, accounting regulators and business participants, especially

those from developing countries will be aware of that the cost of IFRS adoption cannot be necessarily paid off.

FRAMEWORK AND METHODOLOGY

IFRS Diffusion

The International Accounting Standards Board (IASB), the Organization for Economic Cooperation and Development (OECD), the European Union (EU), the International Organization of Securities Commissions (IOSCO), and the United Nations (UN) are international bodies that have been actively promoting the unification of global accounting standards (Wyatt, 1997). Among these organizations, the IASB is the most prominent at international level (Rivera, 1989), and the most active international body with the responsibility to promulgate international accounting standards (Iqbal, Melcher, & Elmallah, 1997).

In 1997, Mueller explained the growing importance of the IASB by stating:

> *Now IASC has evolved as the preferred mechanism for global accounting harmonization. Around the world, including at European Union, there will be more and more joint development projects with IASC, national and regional standard setting agencies will increasingly align their standards with IAS's and the model of private sector IAS-type accounting standard setting appears to have gained the upper hand ...*
> *(Mueller, 1997, p. 11.30).*

The International Accounting Standards Committee (IASC, predecessor of IASB) was established in 1973 by professional accountancy bodies of Australia, Canada, France, Germany, Ireland, Japan, Mexico, the Netherlands, the UK and the US. The IASB itself was established in 2001 as part of the International Accounting Standards Committee (IASC) Foundation. The objectives of the IASC stated in its Constitution (2000) are (1) to develop in the public interest, a single set of high-quality, understandable and enforceable accounting standards that require high quality, transparent and comparable information in financial statements and other financial reporting to help participants in the world's capital markets and other users make economic decisions; (2) to promote the use and rigorous application of those standards; (3) to bring about convergence of national accounting standards and International Accounting Standards to high-quality solutions (IASB, 2007, p. 4). As of January 2000, the IASB membership consisted of 143 professional accounting organizations from 104 countries (Radebaugh & Gray, 2002).

As of 1 January 2007, the IASC has issued 49 accounting standards comprise 8 International Financial Reporting Standards (IFRS) and 41 International Accounting Standards (IAS).3 The most recent study by Deloitte uncover the implementation of IFRS in countries around the world as follows (IASPlus, 2010)

- IFRSs not permitted — 31 jurisdictions
- IFRSs permitted — 26 jurisdictions
- IFRSs required for some firms — 6 jurisdictions
- IFRSs required for all firms — 91 jurisdictions

Choi & Levich (1997) explained that successful harmonization could positively affect capital market efficiency and flows of capital:

> *Harmonization would increase the number of readers qualified to examine accounting statements from foreign countries and it might increase the confidence that people had in their understanding of foreign companies. This, in turn, would expand the volume of international investing and issuing activities. These capital flows would increase capital market efficiency, providing benefits to both investors and issuers in the markets.*
> *(Choi & Levich, 1997, p. 6.21).*

Standards pronounced by the IASB have positively affected the efficiency of global capital market, and this fact is admitted by International Organization of Securities Commissions (IOSCO) that in May 2000 IOSCO recommended its members to use IFRS as a basis to prepare financial statements (Roberts, Weetman, & Gordon, 2002). Further progress made by the IASB when in 7 December 2007, Securities and Exchange Commission (SEC) announced that foreign private issuers in their filling with the Commission financial statements prepared in accordance with IFRS can be used in the US without have to be reconciled with US GAAP (SEC, 2007).

It appears that for countries adopting IFRS, the higher the degree of harmonization with IFRS the bigger the expected benefits they can exercise because the extent of the harmonization influences the extent of cost of capital of investors and at the same time, the extent of efficiency of financial reporting of reporting entity. Rationally, if harmonizing national accounting standards with IFRS has been successful, investors do not have to perform additional works in order to obtain desirable financial information. Likewise, reporting companies do not have to do extra works to produce a higher quality and comparable financial statements.

IFRS Adoption and Developing Countries

What probably overlooked by the proponents of internationalization of IFRS is that most developing countries share business characteristics that could limit their abilities to realize the expected benefits associated with IFRS adoption. While IFRS adoption seems reasonable for developed countries, developing countries might not be able to exercise the same expected economic benefits enjoyed by developed economies due to certain distinctiveness of their accounting and business infrastructure. For instance, lack of skills and knowledge of their accounting professions, companies, and investors; smaller and less developed capital markets; lower level of governance; and limited numbers of international business participants.

Accounting professions in developing countries that in general do not possess sufficient developed skills to comprehend international accounting standards, would suffer from deficient knowledge and interpretation on especially newly enacted standards, that in turn would lead to unreliable financial reporting and auditing. Thus, even if IFRS is adopted in a country; the commensurate benefits are far from reality due to insufficient and incomplete assurances of the quality of its financial reporting. In other words, the decision to converge with IFRS does not necessarily lead to aforementioned economic benefits because convergent at standard-level is not necessarily followed by convergent at practical-level (Lasmin, 2010).

For companies in developing countries, as the preparers of financial reporting, implementing single set of global accounting standards would not bring the same benefits to them in a same way to multinational enterprises (MNEs). MNEs which rarely come from developing economies, would harvest the benefits of IFRS adoption but local or national companies are likely to face its consequences. Several possible difficulties related to IFRS adoption that will be faced by national companies in developing countries are: (1) they have less opportunity to influence the process of international accounting standard, (2) their business and economic circumstances may not be faithfully represented by the prescribed accounting procedures of the global standard, and (3) they may be faced with high costs of changing from one set of standards with little or no correspondent benefits (Roberts, Weetman, & Gordon, 2002).

Similar to the effects of IFRS adoption to companies in developing countries, the benefits reaped by big investors can not outweigh the disadvantages faced by small and medium investors. Small and medium investors relatively do not have adequate expertise and skills to understand the basis on which a financial statement is produced. Furthermore, considering that IFRS is crafted to support developed capital markets, smaller investors especially those that come from less developed capital markets would encounter hard times comprehending the reported figures and interpreting newly enacted standards. This is because implementing IFRS: (1) creates comparability in appearance but conceals real differences in commercial activity and (2) reduce precision of economical transaction recording by instilling too many alternatives, which sometimes are not needed and not relevant to local setting.

Although adopting IFRS might reduce the costs of standards setting process and standards implementation monitoring, the governments as accounting regulators and/or standards setters have to be well aware that the notion of one accounting system fits all countries might not be the only answer. Considering that the composition of international and national stakeholders in individual country varies greatly, so does the need of adopting IFRS. Especially, the potential benefits of adopting international standards might not be materialized because of weak interpretation and implementation. In developing countries, the problems of governance are notorious, rules are often misinterpreted. What was written might not be appropriately implemented. The result is that the comparability of accounting standards may not lead to the comparability of actual financial reporting practices. Another issue is that countries might adopt

IFRS not because potential economic benefits associated with the adoption, but just because countries want to be perceived as socially acceptable and legitimate jurisdictions for doing international business (Judge, Li, & Pinsker, 2010; Lasmin, 2011).

Hypotheses

Previous section makes it clear that in developing countries there are considerable constraints in exercising economic benefits of IFRS adoption. Consequently, IFRS that is tailored by developed countries and supported by international organizations and multinational enterprises might not be suitable for developing countries. Imposing international standards in expense of national standards is regarded as an action that does not recognize the environmental diversities amongst different countries. Countries have their own specific economic, social, political and legal settings, which contribute to the unique financial reporting systems in their jurisdictions. Applying single set of standards to such diverse systems denies the reality of financial reporting diversities and to some extent the sovereignty of developing countries.

Even if adopting IFRS might increase the comparability and transparency of national financial reporting, for developing economies, the high degree of disclosure tends to negatively contribute to national competitiveness because their disadvantages are vividly revealed. Furthermore, accounting standards that are used to reveal their weaknesses are out of their controls because the standards are created by and more suitable for developed economies.

Hence, our hypotheses comprise:

H1. Developing countries adopting IFRS do not experience higher international trade.

H2. Developing countries adopting IFRS do not experience higher FDI inflows

RESEARCH DESIGN

Research Model

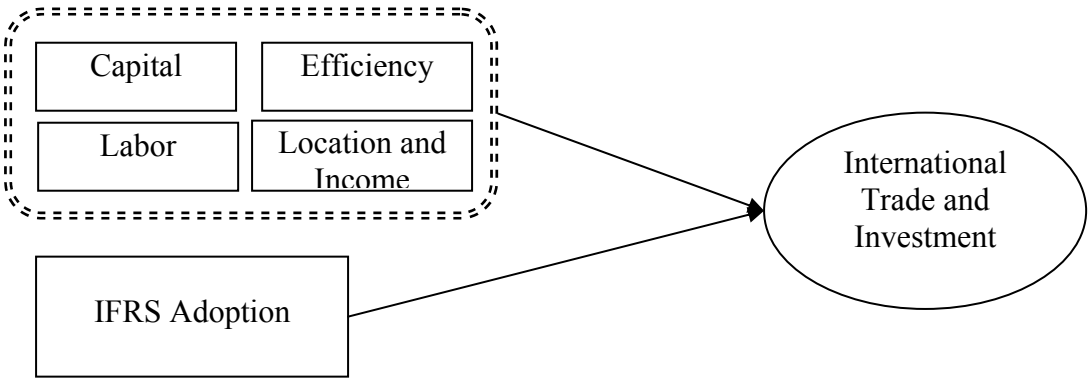
Drawing on a Cobb-Douglas production function where a country's level of production is the function of its respective capital, labor, and efficiency parameter (Cobb & Douglas, 1928), (Xu & Wang, 2000), (Bitzer & Gorg, 2008), we apply these inputs and parameter as control variables in estimating the effects of IFRS adoption on international trade and investment (see Figure 1).

We then use an ordinary least square (OLS) estimation, which is defined as:

$$Y = \beta_0 + \beta_1 IFRS_i + \beta_2 INC_i + \beta_3 POP_i + \beta_4 ICT_i + \beta_5 GOV_i + \beta_6 REGi + \beta_7 GROUP_i + \varepsilon_i$$

Where: Y is the value of FDI inflows, Exports, or Imports; β_0 is the intercept; β_1-β_4 are the slopes/regression weighs that represent the relationships between dependent variable and independent variables; and *ADOPTION* is countries` degree of IFRS adoption, *INCOME* is countries` Gross Domestic Product (GDP) per capita, *POPULATION* is countries` total population, *ICT* is the countries` degree of information and communication technologies, *GOV* is Countries` level of governance, *REG* and *GROUP are* additional control variables for the location and income groups of selected countries.

Figure 1 Research model



== : Control variables, derived from Cobb-Douglas (1928)

Variables

Dependent variable, which represents the value of FDI inflows, Exports and Imports in 2009, retrieved from the World Bank`s World Development Indicators (World Bank, 2010). The independent variable, the level of adoption of IFRS, is retrieved from Deloitte - IASPlus (2008) report surveying current status of the adoption in a wide variety of jurisdictions as of 2008. Consistent with (Hope, Jin, & Kang, 2006) and (Judge, Li, & Pinsker, 2010), 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".

For controlling variables, we select 2008 GDP per capita as a proxy for capital, 2008 total population as a proxy for Labor, 2008 internet subscription as a proxy for Information and Communication Technology (ICT) parameter, and 2008 levels of freedom from corruption as a proxy for countries` levels of governance. We also add the two dummy variables, namely countries` region and income groupings. Level of governance is retrieved from the 2008 Fraser Institute`s Economic Freedom annual report (Gwartney & Lawson, 2008). Other controlling

variables are collected from the World Bank`s World Development Indicators (World Bank, 2010).

Proxies for capital and labor are relatively straightforward and are widely used [(Schneider and Frey (1985), Wheeler and Mody (1992), Tsai (1994), Jackson and Markowski (1995), Taylor (2000), Chakrabarti (2001) in (Nunnenkamp & Spatz, 2002)], (Gholami, Lee, & Heshmati, 2003), and (Baxter & Kouparitsas, 2006)].

ICT is found as one of key determinants for FDI in developing countries (Addison & Heshmati, 2003), and as a main new determinant (Gholami, Lee, & Heshmati, 2003) for ICT could foster innovation and entrepreneurship and transparency, which are in turn, could promote larger volume of investment. Moreover, ICT also decrease time and distance needed to complete a transaction, for example internet marketing, investor inquiries tracking, after sales supports, and partnerships developing (Economou, 2008). Furthermore, ICT offers a unique opportunity for countries to free themselves from the domination of geography. Similarly, goods and services from such countries can be offered on the global market as efficiently as those from any other country through the use of ICT (Addison & Heshmati, 2003).

Specifically, internet usage is found to be significantly related to higher volume of trade, particularly it was found that internet usage has a greater impact on trade among smaller economies than among larger economies (Demirkan, Goul, Kauffman, & Weber, 2009) because it helps to lower prices by reducing search costs, entry barriers and intensified competition, and thus results in higher productivity. Finally, it could substantially decrease inventory costs through direct link among suppliers, producers, and customers, in which a leaner supply chain is created (Economou, 2008) and open up the possibility of accessing commercial and political information that was previously unavailable or severely restricted (Gholami, Lee, & Heshmati, 2003).

Corruption as a proxy for countries` level of governance, has been significantly linked to international capital flows and International Trade. Levels of corruption were found to be grease and sand toward FDI inflows. By and large, high levels of corruption lead to lower volume of FDI inflows (Wei, 2000) (Habib & Zurawicki, 2002) and that of international trade (Gatti, 1999) (Bandyopadhyay & Roy, 2007). However, corruption could also serve as a stimulus for FDI (Egger & Winner, 2005). Finally, to control countries` economic and geographic position in international trade and investment equilibrium, we added two dummy variables that are based on countries groupings from the World Bank geographic and economic classifications (World Bank, 2010), namely region and income group.

RESULTS

Sample Description

We use UNDP's Classification of countries report (UNDP, 2010) to separate developing countries from developed countries. We then run the check on the availability of data on each country and exclude countries whose data are missing. In total complete data of 48 developing countries are able to be collected (see Table 1). The sample consists of relatively balance representation of countries` status toward the adoption of IFRS: 26 adopters and 22 non-adopters, which we believe it provides a fair depiction of current status of IFRS and covers developing countries from all continents.

Regression Results

We first examine the descriptive statistics of all variables. Table 2 shows the statistics of dependent, independent and control variables. To maintain the quality of our model, White test, Breusch-Pagan / Cook-Weisberg test, and variable inflation test are used to assess the existence of heteroskedasticity and multicollinearity for Ordinary Least Squares. In addition, Cameron & Trivedi`s decomposition of IM-test is used to examine the degree of heteroskedasticity, skewness, and kurtosis. We apply the natural logarithm transformation on dependent variables to reduce the skewness and to satisfy the results of Box Cox fitting model, in which it is found that the log-linear model is more efficient.

Table 1: Countries Sampled and Their Adoption Status

Adopters	Non Adopters
Armenia	Argentina
Bahrain	Bangladesh
Botswana	Brazil
Chile	China
Croatia	Colombia
Egypt, Arab Rep.	Cote d'Ivoire
Fiji	Ecuador
Georgia	India
Ghana	Indonesia
Guyana	Korea, Rep.
Hong Kong SAR, China	Malaysia
Jamaica	Mexico
Jordan	Pakistan
Kazakhstan	Philippines
Kenya	Russian Federation
Kyrgyz Republic	Saudi Arabia
Lebanon	Singapore

Table 1: Countries Sampled and Their Adoption Status	
Adopters	Non Adopters
Macedonia, FYR	Sri Lanka
Mauritius	Thailand
Namibia	Tunisia
Nepal	Turkey
Panama	Vietnam
Peru	
Serbia	
South Africa	
Ukraine	

Table 2: Descriptive Statistics					
Variable	Mean	Std. Dev.	Min	Max	Corr to FDI
FDI	21.44215	1.839882	17.45772	25.08244	1.0000
EXPORT	24.11218	1.751263	21.00911	27.91872	0.8575
IMPORT	24.23670	1.545219	21.28297	27.73829	0.8595
ADOPTION	.5208333	.5048523	0	1	-0.4130
GDP	4706.969	6827.068	253.5529	34519.73	0.3101
POP	9.20e+07	2.47e+08	763437	1.32e+09	0.4439
ICT	1.59e+07	4.42e+07	103000	2.98e+08	0.4578
GOV	36.89362	15.76627	20	94	0.2290
REG	3.395833	2.090908	1	7	-0.3640
GROUP	1.125	.3342187	1	2	0.1633

Table 3 shows that the effects of adopting IFRS are significant for all dependent variables and negatively signed, suggesting that all hypotheses are supported. The results show that the effects of the developing countries` decision to adopt IFRS on the volume of their FDI inflows and international trade are considerably unenthusiastic. Developing countries experience declining FDI inflows one year after they decided to embrace IFRS. Likewise, countries adopting IFRS also have to accept the facts that the values of their export and import do not increase as previously expected.

Table 3: Regression Results						
Variable	DV: FDI		DV: EXPORT		DV: IMPORT	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ADOPTION	-.9080047	-1.96***	-1.575832	-4.63*	-1.315056	-4.39*
GDP	.0001205	1.56	.0001121	1.99***	.0001045	2.11**
POP	2.63e-09	1.60	1.54e-09	1.29	1.80e-09	1.71***
ICT	2.56e-09	0.28	6.78e-09	1.01	4.89e-09	0.83
GOV	.003852	0.16	-.0042818	-0.25	-.0061911	-0.41

Table 3: Regression Results						
Variable	DV: FDI		DV: EXPORT		DV: IMPORT	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
REG	-.1674625	-1.42	-.1173639	-1.37	-.1057255	-1.40
GROUP	-1.107877	-1.00	-..0174033	-0.02	-.0908842	-0.13
Intercept	22.72419	15.87	24.69801	23.66	24.84235	27.04
F value	5		12.21		12.36	
R-squared	.4730		.6923		0.6948	
Adj R-squared	.3784		.6356		0.6386	
Note: *p<0.01; **p<0.05;***p<0.1						

For robustness check, we exclude FDI and export/import influential non adopters from our data set. Specifically, we run series of regressions after omitting BRIC countries (Brazil, Russia, India, and China) whose volume of FDI inflows, export, and import are substantially larger compared to those of other non adopters. Table 4 provides the results that still support our hypotheses. In general, we find no significant positive relationships between developing countries` decision to adopt IFRS and their subsequent FDI inflows, export and import performances. Specifically, the results reveal that although it is not significant, IFRS adoption has a negative relationship with FDI inflows; and the adoption significantly contribute to lower volume of export and import.

Table 4: Regression Results (Without BRIC)						
Variable	DV: FDI		DV: EXPORT		DV: IMPORT	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
ADOPTION	-.1034085	-0.19	-.7596928	-2.10**	-.5137414	-1.70***
GDP	.000093	1.24	.0000967	1.95	0.0000899	2.17**
POP	8.75e-09	1.44	5.93e-09	1.47	6.37e-09	1.89***
ICT	4.10e-08	1.19	6.75e-08	2.95	6.43e-08	3.36**
GOV	.0202627	0.84	.0083403	0.52	.0060404	0.45
REG	-.133949	-1.15	-.0563965	-0.73	-.0470721	-0.73
GROUP	-.8420228	-0.79	.0387645	0.05	-.0409026	-0.07
Intercept	20.82134	13.33	22.95778	21.94	23.14437	26.49
F value	3.85		13.50		15.14	
R-squared	.4352		.7354		.7571	
Adj R-squared	.3223		.6809		.7071	
Note: *p<0.01; **p<0.05;***p<0.1						

DISCUSSION AND CONCLUSIONS

Most studies of countries decision to adopt IFRS has been focusing on the effects of the adoption to accounting quality, comparability of financial reporting, income smoothing, investors' reaction, and auditors' behaviors. Our study is one of the first of its kind that examines the macro-level effects of IFRS adoption. The results suggest that adopting IFRS does not significantly lead to higher volume of international trade and investments.

Main stream belief contends that higher quality of accounting standards, as a result of adopting IFRS, are substantially related to the chance of obtaining economic benefits such as a higher FDI inflow and higher volume of international trade. This belief stands on one premise that all countries share common institutional context where the relation of the adoption and its associated economic benefits established in a particular country or a particular group of countries is also applicable to a country or a group or country in other regions. However, IFRS that is crafted by developed countries and appears to work well in those countries (Marques-Ramos, 2008), might not able to create the same relationship in developing countries because of different socio-economy and political-economy environments (Lasmin, 2011).

Moreover, it is extremely difficult to develop a high-quality financial reporting infrastructure that could guarantee the continuing effective harvest of implementing global accounting standards. While adopting IFRS demonstrates the desire to have a consistent, comprehensive and based on clear principles accounting standards that could potentially help developing countries to obtain certain economic benefits from adopting IFRS, merely adopting is not enough. Other infrastructures that might not be satisfied by developing countries are: (1) Effective corporate governance practices and strong internal controls; (2) Sound auditing practices; and (3) A strict enforcement or oversight mechanism (Tweedie, 2005).

We concede that the results of our study should be interpreted carefully due to several limitations. First, we heavily rely on archival data. The decision of countries to adopt or not to adopt IFRS must be examined further by revealing the real motives and by expanding the definition of adoption. Second, considering that the effects of adopting IFRS might change over time, investigating the diffusion of IFRS and its impacts in a longer observation period and bringing new models or more variables in would improve the quality of our study.

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ECONOMIC DEVELOPMENT PROSPECTS FOR A SMALL ISLAND ECONOMY: THE CASE OF GUAM

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ABSTRACT

This paper focuses on key characteristics of a small island economy in order to evaluate its economic development prospects. In particular, this paper has chosen to study the economy of the island of Guam, identified its key characteristics and investigated the economic development challenges it faces and the opportunities available to it.

INTRODUCTION

Guam is an unincorporated territory of the United States. It is an island located in Western Pacific and provides the U.S. with a strategic advantage to secure the defense and stability of the Asia-Pacific region. As an economy, Guam is small and undiversified but is endowed with natural resources and a multicultural labor force. After World War II, Guam proved itself to be a resilient economy. However, in the more recent past which was, and still is, characterized by increased globalization, Guam faced many factors that were beyond its control, which when combined with having to deal with natural disasters, took a toll on the well-being of its people. Of course, globalization and natural disasters are among many other challenges that Guam continues to face. The key is to find a balance between the positive and negative aspects of the economy and society and to transform these challenges into opportunities that will improve the current situation. Doing so will put Guam in a position of strength as it forges ahead in its pursuit of economic development.

ENVIRONMENTAL ANALYSIS

An analysis of the environmental factors or conditions that are relevant to Guam's prospects for economic development is a good starting point for evaluating the challenges and opportunities that are available to Guam. In this regard, several descriptors have been identified to describe key characteristics of the Guam economy, with this paper focusing on the following six: (1) a small island economy that is relatively open that is (2) currently lacking economic diversification but (3) endowed with natural resources and a (4) multicultural society. It is (5) an unincorporated U.S. territory (6) located strategically in Asia-Pacific. Each descriptor presents Guam with challenges and at the same time opportunities. These descriptors and their implications for challenges and opportunities in economic development are discussed in the next section in turn.

SMALL ISLAND OPEN ECONOMY

Small Domestic Economy

Guam's smallness can be measured in several ways. First is in terms of its small population, which is estimated to be around 175,000 people and, consequently, a small labor force of around 74,950, of which 64,970 (86.7%) are employed and 9,970 (13.3%) are unemployed based on the latest unemployment report in March 2011(Guam Bureau of Labor Statistics). During stronger economic periods when labor demand exceeds the available labor force, Guam has supplemented its local labor force with those from the U.S., neighboring island that are freely associated with the U.S. ((i.e. the Commonwealth of Northern Marianas, Federated States of Micronesia, Republic of the Marshall Islands and Palau) and the use of foreign workers.

Guam is also small in terms of economic size. The latest estimate of its overall economy, its Gross Domestic Product, GDP (also referred to as Gross Island Product, GIP) is for the year 2007 and valued at around $4 billion (U.S. Department of Commerce-Bureau of Economic Analysis, 2010). Combining estimates of GIP and population gives rise to per capita income, which is a measure of purchasing power, of around $23,000.

Guam's small population and relatively lower per capita income have prevented many businesses from achieving economies of scale and producing goods and services to local residents at lower prices. Not surprisingly, the cost of living on Guam is high but not different from other small island economies, including Hawaii. Guam's lack of economies of scale also presents challenges to autonomous government agencies that provide utilities and is also an obstacle from current efforts toward recycling, which have required recyclable materials to be gathered and then shipped off-island for recycling.

Guam's smallness also manifests itself in terms of its limited productive resources. The prospects of significant economic growth from the pending expansion of the U.S. military presence on the island have created expectations of shortage in available resources, including labor of different skills (including construction-related) as well as physical, social and institutional infrastructure. In addition, the limited productive resources available to Guam can be viewed as both cause and consequence for the island's lack of economic diversification (More on this later; see also Duncan and Nakagawa, 2006).

Open Economy

Like many small economies, Guam is a relatively open economy, especially in trade of goods and services. Guam imports around 36% of its GIP, showing a high dependence on imported supply but not quite uncommon among small island economies in the Pacific. Guam's exports have primarily come from services to tourists, which account for 16.5% of its GIP (U.S. Department of Commerce-Bureau of Economic Analysis, 2010). The heavy reliance on tourism makes Guam vulnerable to external shocks that affect its main tourist markets, primarily Japan, including most recently the March 2011 earthquake and tsunami that devastated the northeastern part of Japan and led to a significant decline in tourist arrivals from Japan. These external

shocks could also be positive for Guam such as the appreciation of the Japanese yen and Korean won against the U.S. dollar which made tourism on Guam more affordable to Japanese and Korean visitors.

To some extent, Guam's openness applies to its labor market and migration, allowing from a free movement of labor among other island economies in Western Pacific which have free association with the U.S. and the fifty states of the U.S. As already noted, this labor market arrangement has supplemented Guam's small labor force during times of high labor demand but has caused high unemployment during slower economic times as would explain the high unemployment rate of 13.3% reported in March 2011 (Guam Department of Labor, 2011).

Island Economy

Guam is the largest island in the Micronesian region and is located in the Western Pacific Region. Being an island is significant in that it implies some level of geographic isolation and distance from larger markets. It also suggests exposure to natural disasters such as typhoon, earthquakes and tsunamis.

Guam's smallness, openness and island-setting suggest benefits from attracting more resources, including foreign investments, to supplement its limited productive resources and also balance out the island's high imports. This descriptor of Guam, especially its implication for the lack of economies of scale, points to the absence of mass production of many products but suggests opportunities for niche markets and for small business participation. Although the government sector (a combination of U.S. Federal government agencies and local government agencies) continue to make up a significant share of the economy (48% of Gross Island Product in 2007, U.S. Department of Commerce-Bureau of Economic Analysis), the economy has made a notable shift toward a larger role of the private sector, including small businesses. Recent employment estimates show that 75% of jobs are provided by private businesses, 19% by the local government and 6% by the U.S. Federal government (Guam Department of Labor-Bureau of Labor Statistics, December 2010). In terms of numbers, the private sector is comprised of 3,143 business establishments (U.S. Bureau of Census, 2007), with more than 90% of them classified as "small businesses" using the U.S. Small Business Administration definition.

LACK OF ECONOMIC DIVERSIFICATION

Guam's limited productive resources and lack of economies of scale prevent it from achieving the type of economic diversification that larger economies are able to enjoy. It would not be much of an over-simplification to view Guam's economy as a triad, comprised of three industries (tourism, military and local economy) or serving three groups of customers (tourists, military personnel and families, and local residents).

Tourism

Tourism was very strong in 2010, with approximately 1.2 million tourists who visited Guam (Guam Visitors Bureau, December 2010). As already noted, tourism decreased this year,

largely due to the lower number of Japanese visitors. Prospects for tourism-related economic activities are not optimistic for the remainder of the year. It is too bad that Guam's comparative advantage as an island is in tourism, which happens to be very unstable because it is hostage to factors outside of Guam's control and to external shocks. Tourism is an industry that is very sensitive to the income of tourists and tourist activities would be one of the first to be reduced when times are tough) as well as health and safety threats that affect travel (9-11, SARS, H1N1, etc.). It is in many economies, not only on Guam, a relatively low-paying, low-productivity service sector with little opportunity for innovation. It also puts Guam in direct competition with neighboring islands, including Hawaii. Guam's tourism agency, the Guam Visitors Bureau, has not fallen short of exploring ways to further develop and diversify our tourism sector. While these efforts must be recognized and encouraged, we must consider other viable economic activities that can provide the island with an alternative source of income, especially during times when our tourism sector is on a decline.

Military

The military market is also significant in Guam. Expectedly, it claimed a larger share of the economy in the aftermath of World War II and has since decreased, although still notable. It usually reflects itself in construction and engineering services industries, although there are opportunities to get involved in military bases' maintenance and operation. The concern here is that decisions affecting the military presence on Guam are made externally, in this case, by the U.S. Federal Government, in consultation with foreign government(s). For instance, the U.S. and Japan entered an agreement in 2006 to realign U.S. military forces in Asia. Of particular interest to Guam is the proposal to relocate 8,000 military personnel and their families from Okinawa, Japan to Guam. Such military build-up on Guam was originally valued in excess of $10 billion (2.5 times the size of the current Guam economy) and was originally planned to take place over a short four-year period, after which the military-related construction boom would be expected to decline. More recently, there has been uncertainty regarding the terms, magnitude and timing of this military build-up, in part due to the recent natural disasters in Japan as well as to new developments in the U.S. Congress. Much depends on the fiscal health of both the U.S. Federal Government and the Government of Japan, which initially agreed to share the cost of the military buildup on a 40-60 basis (approximately). That delays likely increase earlier estimates of costs worsens this fiscal concern.

Local Economy

The instability of tourism, the unpredictability of the military build-up and the inability of Guam to significantly influence both economic sectors have made the third sector, which caters to the local residents, the more attractive sector. This sector provides strong support for retail trade and many different services including health, education, financial, legal, etc. This is also the most promising area for the strong majority of local businesses, which are small businesses.

All of the above brings to light the importance of self-reliance: the need to rely on the local economy, to develop it by identifying new industries, to enhance its purchasing power so

that it will be the engine of growth that propels the entire economy into a sustainable and participatory development path that improves Guam residents' standard of living.

Opportunities for economic diversification would include those products that have potential to be exported but Guam's territorial status and the high transaction costs (including shipping) have presented challenges in this area. The more realistic option appears to be on the import side of trade where a search for ways to produce goods and services locally to reduce the current dependence on imported supply offers more promise. As discussions continue regarding the prospects of new industries on Guam, it would be helpful for these discussions to be guided by what emerged to be truly important to the island community

- Increase in the standard of living and ability to provide materially for families
- Smart management of the environment to ensure sustainability
- Resurgence of pride in our indigenous culture and resources

and pursue those new industries that are not economically viable but also encourage

- High productivity and value-added, intensive use of human capital and technology
- Use of "green" technology and practices, non-carbon printing and, if possible, carbon-reducing
- Intensive use of indigenous resources including human talents and local materials.

Efforts to replace imports in a cost-effective manner will provide a boost to the local economy. Assuming a spending multiplier of 1.5, one is able to illustrate how significant the economic impact would be of shifting 10% of what is currently imported to a local source in terms of an increase in GIP by 25% (or $1 billion), an increase in the local government's revenue in terms of Gross Receipts Tax by 4% of $1 billion (or $40 million), and an increase in local jobs by 23% (or 14,000 jobs).

NATURAL RESOURCE ENDOWMENT

Guam's abundance in beaches, beautiful scenery, natural forests and marine life has made it an attractive site for tourism, military operations and research and development. Opportunities exist in developing ecotourism that caters to all three segments of consumers, tourist, military and local residents. The availability of land, along with government incentives to use them productively, points to a continuous evaluation of prospects for expanding the agricultural sector. Of course, as natural resources are used to support economic activities, there is a need for effective management of natural resources in order to preserve their quality and sustain their usefulness. Guam has a long history of community activism to ensure that uses of natural resources are kept in check.

MULTICULTURAL SOCIETY

Guam's population is composed of with 37% Chamorro (Guam's native culture), 27% Filipino, 7% other Pacific Islander, 6% non-Filipino Asians, 7% Caucasian, 2.2% all others (Guam Bureau of Statistics and Plans, 2010). One advantage of having a multicultural society is that the island becomes a melting pot of different ideas and talents. It also possesses a richness in culture, which provides opportunities to incorporate "experience" in tourism, and a greater understanding and appreciation for diversity. All of these create flexibility, creativity and economic resilience. On the other hand, challenges arise as they are many differing opinions, perspectives and approaches, thus making reaching a consensus more difficult and time-consuming.

UNINCORPORATED U.S. TERRITORY

Guam's status as an unincorporated U.S. territory is both a blessing and a curse. On the positive side, it provides an attraction for both tourists and foreign investors, who benefit from having a English-speaking population, the presence of U.S. legal infrastructure, an economically free environment to do business, a democratic political structure and the presence of labor protection (e.g., minimum wage laws). As a territory, Guam receives funds from the U.S. Federal government that finances a significant portion of its physical infrastructure that are conducive for business. Guam also uses the U.S. tax system and is able to keep taxes collected from local residents as well as from U.S. military personnel who are stationed on Guam.

The downside of being a U.S. territory includes limits on the economic policy tools available to local policymakers and economic planners. As regards fiscal policy, Guam has its own elected legislatures that make budget decisions, with a lot of flexibility on spending decisions but have less flexibility on making revenue decisions because the primary source of revenue (income taxes) are set to follow the U.S. Federal system. Unlike politically-independent economies, Guam has no monetary policy to use to effectively manage the local economy and is subject to decisions made by the Washington, D.C.-based central bank, the Federal Reserve. This policy limitation extends to currency matters and exchange rate determination. In addition, being a U.S. territory has made Guam ineligible to access financial and technical assistance from international organizations, resources that other countries have used to support their economic development. For better or worse, Guam's minimum wage laws have priced it out of the of many labor-intensive industries in nearby Asian economies, effectively limiting the number of possible industries it could develop and, to some extent, forcing it to look at higher-paying industries that often require higher levels of human capital.

STRATEGIC LOCATION IN ASIA-PACIFIC

Guam's location in the Asia-Pacific region has been described to be strategic, thus making it an attractive site for military operations. In fact, the 2006 military forces agreement between the U.S. and Japan is motivated largely by Guam's strategic location. This attractiveness to military operations brings with it both benefits and costs and hence requires a

careful balance of these two effects. For example, the proposed military build-up on Guam has received numerous scrutiny from those in favor of it as well as those opposed to it that achieving the balance has called for a need for strategically pacing the resulting economic development (e.g., adaptive program management) in order to match up the required resources (infrastructure, human capital) with their availability. Evaluating the benefits and costs of the military build-up (as well as other proposals for economic changes) have brought to light the need for current, reliable and relevant socio-economic data and models that can be used to accurately estimates the benefits and costs of military (as well as non-military) proposals/projects and to serve as evidence for effective policymaking.

Guam's location puts it in close proximity to the dynamic Asian markets, with several of them within a 3-5 hour direct flight distance. These point to opportunities to enhance travel infrastructure, for example, to explore additional air routes between Guam and important regional markets, thus having the effect of increasing competition among air carriers and potentially making travel more affordable to local residents as well as to tourists. On the other hand, proximity to Asia brings with to Guam the challenge of competing with other tourist destination in Asia. It also causes a leakage from the local economy as local residents travel to the neighboring Asian destination to shop at much lower prices and enjoy a wider variety of goods and services.

Table 1 summarizes the challenges and opportunities associated with each characteristic/descriptor of Guam's economy.

Table 1: Summary of Challenges and Opportunities in Guam's Economic Development

Characteristics/Descriptors of Guam	Challenges Faced by Guam	Opportunities Available to Guam
(1) Small, island, open economy	• Economic instability/vulnerability or exposure to external factors and external shocks • Small labor force and limited productive resources • Inability to engage in mass production has led to higher cost to operate business, provide utilities, recycle	• Increased outward orientation with regards to tourism, imported goods and services, foreign investment and military hosting • Opportunity for niche markets and greater small business participation
(2) Lack of economic diversification	• Heavy reliance on three sectors: tourism, military and local economy and increase exposure to shocks that negatively affect at least one sector	• Opportunity to explore new industries to supplement, complement and/or substitute existing industries • Opportunity to incorporate island community values to "designing" new industries

Table 1: Summary of Challenges and Opportunities in Guam's Economic Development		
Characteristics/Descriptors of Guam	**Challenges Faced by Guam**	**Opportunities Available to Guam**
(3) Endowed with natural resources	• Need for effective management of natural resources	• Opportunity for more eco-tourism • Opportunity to further develop the agricultural sector and other natural resources
(4) Multicultural society	• Many different opinions and difficulty to reach consensus	• Different ideas and talents, a richness in culture, an understanding and appreciation of diversity, economic flexibility/resilience
(5) An unincorporated U.S. territory	• Limited economic policy tools • Ineligibility for international development assistance • Inability to compete directly with low-waged Asian countries in many labor-intensive industries	• Opportunity to strengthen Guam's image as an attractive business/investment site and tourist destination
(6) Located strategically in Asia-Pacific	• Need for strategically pacing economic development • Need for current, reliable and relevant socio-economic data and models to accurately evaluate impacts of military and other economic changes • Direct competition with Asian markets	• Opportunity to benefit from hosting existing and increased military operations • Opportunity to access nearby Asian markets and to enhance travel infrastructure

CONCLUSION

This paper presented an in-depth evaluation of the environmental factors that affect Guam's economy and its future development prospects. Challenges and current realities were presented to see what might be obstacles to transforming Guam's economy but opportunities for future economic development were also highlighted to see what Guam's economy could be and where options to develop it are available. One thing is clear: the island community needs to make the choice to be willing to work collectively toward addressing the challenges in developing its economy and moving forward. Perhaps an obvious point but one that is worth stating: Guam is not unique in as far as having to face challenges. However, its population can

distinguish itself from those in many economies facing similar challenges in the way that it collectively responds to these challenges and to bring about improvements in economic and social conditions for the people of Guam.

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LEGAL ORIGINS AND STATE ECONOMIC FREEDOM

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ABSTRACT

Problems associated with economic development have recently focused on the role of institutions. Arguably, the most important institutional structure is the rule of law. Previous research has drawn attention to the relationship between a country's legal origins and its current economic, legal, and political institutions. In this paper we extend this literature to the U.S. states. We find evidence that state legal origins help to explain its current economic institutions as measured by the Economic Freedom of North America index. States originally settled by civil law countries have lower levels of economic freedom as a result.

INTRODUCTION

The subject of economic development has transformed significantly in the past century. Historically, economic development fixated upon factors of production like capital and labor and less on the role of institutional quality in determining economic outcomes (Hall et al. 2010). As a result of the work of Nobel Laureate Douglass North (1990) and others, institutions have increasingly been considered an important force characterizing economic progress. North's work in particular, both in his earlier work (North, 1994) and in his later work (North et al., 2009) has helped to reshaped the way economists analyze the issue of economic development and turned attention toward looking at the effect of institutions – "the humanly devised constraints that shape human interaction" (North, 1990, 3) – on economic performance. In recent years, a growing body of research has used the Economic Freedom of the World (EFW) index (Gwartney et al., 2010) to measure institutional quality and has found a strong, positive relationship between quality institutions and economic growth (see, for example, Dawson, 1998; Gwartney et al., 1999; Cole, 2003; Gwartney et al., 2004; Gwartney et al., 2006; Hall et al., 2010).

If institutions are important to economic growth, then it is necessary to understand what factors are associated with institutional quality. Recently, the empirical literature discussing the relationship between institutions and economic growth has grown substantially. However, little focus been given to examining the sources of institutional quality across countries, with a few notable exceptions such as such as Crampton (2002), De Haan and Sturm (2003), Boockmann and Dreher (2003), Heckelman and Knack (2008), and Lawson and Clark (2010). While these studies are valuable, they limit their focus to recent causes of institutional change. As a result, they potentially overlook historical determinants of institutional quality. Countries with poor

institutions in the past tend to have poor institutions today. Thus, we need to look to history – at least in part – for a better understanding of the sources of institutional diversity. A series of influential studies begun by La Porta et al. (1997; 1998) examine the relationship between a country's current economic condition and the origin of their legal system. Essentially, contemporary market conditions are potentially explained by past and present legal conditions, with present legal conditions represented as a function of past legal conditions.

In this paper we build off these important studies by taking a first look at the impact of colonial origins of U.S. states on current state economic freedom, with a particular focus on the role that the legal system of the settling country has on current institutional quality. As is recent convention in the empirical institutional literature, we measure a state's current institutional quality using the Economic Freedom of North America (EFNA) index, published annually by the Fraser Institute. We begin our analysis with further discussion of how the legal origins of state settlers might influence current institutional quality. We then proceed to describe our data and empirical approach, present our results, and then summarize our findings with a few concluding remarks.

LEGAL ORIGINS: CIVIL VS. COMMON LAW

Discovering the relationship between institutional quality and economic growth has motivated a well-defined body of research focusing on how good institutions are formed. Arguably, high-quality institutions are formed when the rule of law is in place because the rule of law facilitates the formation of other good institutions by creating certainty and protection from expropriation (North et al., 2009). Recently, economists have produced empirical evidence that financial markets contribute to economic growth and strong legal institutions contribute to the growth of financial markets (Mahoney, 2001). The question is which legal institutions are best for economic development?

The reason this inquiry is important is because over time, multiple structures of legal institutions have formed representing different traditional legal systems (Mahoney, 2001). The two most common legal systems are civil and common law. The common legal tradition is primarily associated with England and the civil legal tradition with France (although its origins are Roman). Hayek (1960) argues that English and French concepts of law originated from their respective notions of liberty. English models of liberty are derived from Locke and Hume, who emphasized individual freedom, while the French model of liberty is derived from Hobbes and Rousseau who emphasized government's freedom to pursue the public's interest. In this way, common law became a law of property. Civil law, on the other hand, continually faces the risk of the legislature altering existing rights for political purposes or in the public interest (Mahoney 2001). According to Merryman (1985), common law developed to protect the property rights of citizens from the monarch. Because of the ever present risk of government expropriation of

property under civil law, Hayek (1960) argued that the British common legal tradition was superior to the French civil legal tradition.

In recent years, empirical research in law and economics has gone beyond a discussion of the differences between the two legal traditions and instead focused on possible differences in economic outcomes between the two types of legal traditions. Common and civil legal traditions have spread throughout the world by conquest and imitation and thus many countries legal systems have their roots in either British common law or French civil law. The ability of common law countries to provide investors greater protection from expropriation by corporate insiders led La Porta et al. (1997) to look at differences in investor protections between common law and civil law countries. From their initial research comes a large body of work suggesting the "economic consequences of legal origins are pervasive" (La Porta et al., 1998, 298). They find that, when compared to countries employing some version of the French civil legal system, common law countries have more developed financial markets, lighter government ownership, less regulation, less corruption, and more independent judiciaries. These economic consequences tend to be related to improved resource allocation; thus, it is not surprising that Mahoney (2001) finds that British common law countries grew 0.6 percentage points faster that French civil law countries from 1960 to 2000.

In three papers, Berkowitz and Clay (2004; 2005; 2006) utilize the fact that ten of the U.S. states were settled by France, Spain, or Mexico and thus had civil law systems prior to the American Revolution. While all ten states, except for Louisiana, eventually transitioned to the common law, their work finds that these states civil law origins explain several important institutional features of these states today, the most important of which is the impact of legal origins on the quality of state courts today. Berkowitz and Clay (2005) find that civil law states have had a higher degree of constitutional instability over time, which is negatively related to the quality of state courts. Berkowitz and Clay (2006) investigate the relationship between legal origins and state court quality more in-depth and find a negative relationship between the number of years a state was a civil law state and state court quality in the early 2000s. Given the pervasiveness of economic outcomes related to legal origins from an international perspective, Berkowitz and Clay's research is important because it points toward the significance of legal origins in understanding current economic institutions as well as legal institutions.

DATA AND EMPIRICAL APPROACH

In order to test the hypothesis that legal origins are related to current economic institutions, we need data on both legal origins and economic institutions. Our data on the legal origins of states was obtained from Berkowitz and Clay (2004; 2005; 2006). They note that there are ten current states that initially had civil law origins because they were initially settled by France, Mexico, or Spain. These states are Alabama, Arizona, Arkansas, California, Florida, Louisiana, Mississippi, Missouri, New Mexico, and Texas. Eventually all of these states, except

for Louisiana, adopted common law. The adoption of common law by most of these states occurred after the American Revolution in 1776. Arguably, those states that shifted from civil to common legal structures retained some of the elements of the civil legal system.

The remaining states were settled with common legal structures, either through British settlement or American expansion. For the purpose of this analysis these two will be grouped into common law states. There are mild variations in these two forms of common law, but they are extremely similar and are also distinctly different from the civil legal tradition. American states are denoted as settler states and British states were colonized states (Berkowitz and Clay, 2006).

The dependent variable for this analysis is the North American Economic Freedom Index (EFNA) published annually by the Fraser Institute, a Canadian think tank (Karabegović and McMahon, 2008). The EFNA measures the extent to which a state's economic institutions are consistent with resource allocation being guided by personal choice in markets, rather than by collective decision-making. The authors of the EFNA gather third-party data on ten variables in three policy areas to measure the economic freedom of each state (and Canadian province). Since we are measuring the effect of legal origins on economic institutions, it is important to note that there are zero variables in the EFNA that directly measure legal institutions such as the rule of law. Each variable, such as total tax revenue as a percentage of GDP, is placed onto a zero-to-ten scale and then aggregated into a zero-to-ten overall freedom score. Thus, higher scores represent higher levels of economic freedom. Since the data used in the EFNA are published with a lag, the fact that we employ the 2008 edition of the report means that we are using index scores representing state economic freedom in the year 2005. In that year the most free state at the all-government level was Delaware with a score of 8.5 and the least free was West Virginia with a score of 5.3.

Table 1: Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
North American Freedom Index (2005)	6.688	0.58	5.3	8.5
Ln Per Capita Income (2005)	10.405	0.145	10.123	10.778
Ln Initial Population	-0.369	2.377	-3.912	1
Civil Legal Origin	0.2292	0.4247	0	3.797
Climate	13.13	7.5	1.99	39.79
% Slave Population in State	10.29	17.74	0	57.2
Southern States	0.229	0.424	0	1

Summary statistics for all the variables can be found in Table 1. Our control variables that might be related to long-run institutional quality were also obtained from Berkowitz and Clay (2004; 2005). These control variables are the initial population of the state, its climate, percentage slave population, and the southern states. For further documentation on each variable

see Table 1 of Berkowitz and Clay (2005). The intuition for each of these control variables is straightforward. For example, the size of a state's initial population is positively related to vote cycling and thus negatively related to the stability of a state's constitution over time, thus it might be positively related to current state institutional quality. Similarly, climate, slave population, and the a binary variable for a Southern Confederacy state are attempting to control for the influence of slavery and the extractive institutions often associated with hotter climates.

EMPIRICAL RESULTS

In this section we estimate the effect legal origins have on contemporary economic performance using the North American Economic Freedom Index of 2005. The independent variable of interest is the binary variable that represent if a state is a descendent of a civil legal tradition (1=civil, 0=common). Table 2 depicts the model's results, estimated using ordinary least squares (OLS). The coefficient on the legal origins variable is negative and significant at the 10 percent level, suggesting a negative relationship between a state being founded by a civil law country and its current economic institutions as measure by the Economic Freedom of North America index. This result holds while controlling for other important historical variables such as being a member of the Confederacy, a state's climate, and its slave population.

Table 2: Economic Freedom and Legal Origin: OLS Results

Variable	Coefficient	T-Score
Constant	**7.08**	36.6
Civil Legal Origin	**-0.4314**	-1.98
Ln Initial Population	0.009	0.27
Climate	-0.0154	-0.91
% Slave Population in State	-0.017	-1.19
Southern States	**1.231**	2.26
N	48	
R-sq	0.1	

Note: Variables statistically significant at least at the 10% level are in bold.

It is interesting to note that states that were members of the Confederacy have higher economic freedom today, ceteris paribus, contrary to what a priori theorizing would suggest. Perhaps this occurs the EFNA measures primarily areas like taxation and spending policy - areas where the legacy of slavery indirectly leads to less economic freedom because of reduced provision of publicly-provided goods – then areas like property rights and the rule of law where's slavery's legacy has been to inhibit economic freedom. Further research is needed to

reconcile this finding with the work of Carden (2009) and others on the impact of slavery and the Confederacy on institutions.

CONCLUSION

In this paper we analyzed the role of legal origins in explaining current institutional quality at the U.S. state level using the Economic Freedom of North America index. Building on previous work by Berkowitz and Clay (2004; 2005; 2006), we exploit the fact that ten states were settled by the civil law countries of France, Spain, and Mexico. After controlling for initial conditions, including climate and membership in the Confederacy, a state that descended from a civil law legal tradition has lower economic freedom today, ceteris paribus, when compared to a state that was initially settled by a common law country. This finding creates further support for the importance of legal origins to current economic institutions as well as getting towards a better understanding of the historical origins of present-day institutions.

Further research is needed, however, to further explore the role of other factors in explaining current economic institutions. In particular, it would be interesting to note if this result holds up after controlling for other factors that might be related to a state's legal origins. For example, common law states tended to have industrial economies and civil law states were more agricultural. If civil law states are more likely to have extractive economic and political institutions (Acemoglu et al., 2001) in a manner not controlled for with the percentage of slave population and the South binary variable, then our results might overstate the relationship between legal origins and current levels of economic freedom. It is also possible that rather than directly influencing economic institutions, legal origins could work indirectly through these and other factors, such as culture. Following from Tollison (2007), we would urge future researchers to explore the rich data on political and economic institutions available in the Book of the States (Council of State Governments, 2010).

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DYNAMIC TRANSACTION COSTS AND FIRM BOUNDARIES IN THE SOFT DRINK INDUSTRY

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ABSTRACT

Recent articles in the business press have drawn attention to firms integrating different stages of their supply chain. This purported increase in vertical mergers and the awarding of a Nobel Prize to Oliver Williamson in 2009 provide an excellent opportunity to reflect on the efficacy of economic theory in explaining shifts in the vertical boundaries of the firm. The dominant approaches emphasize the role of transaction costs and agency costs in determining the optimal level of vertical integration. This paper argues that the narrow focus on incentives by these approaches has ignored the role of organization in coordinating complementary activities that require very different types of know-how. Capabilities theory which stresses the knowledge, skills, and experience of firms contends that it is the transaction costs that emerge from trying to coordinate these types of activities that best explain the vertical boundaries of the firm. This paper argues that the capabilities story best describes the economic rationale for vertical integration (or disintegration). A case study analyzing vertical integration in the carbonated soft drink industry is presented.

INTRODUCTION

There have been numerous articles in the business press identifying an increase in the number of vertical mergers. This increase in activity has sparked a debate over whether these mergers represent a general movement towards vertical integration, reversing several decades of outsourcing and vertical disintegration (Gross, 2006; Denning, 2009). Despite differences in opinion over trends, observers agree that, unlike the large corporations of a hundred years ago, current efforts are not leading to full-blown vertical integration. "Today's approach is more nuanced. Companies are buying key parts of their supply chains but most don't want end-to-end control" (Worthen, et. al., 2009).

These articles have put forth a variety of explanations for this increase in "selective vertical integration" (Gross, 2006). One is that rising commodity prices (and price volatility) have spurred manufacturers to purchase suppliers of commodities. "Having bulked up acquiring rivals, manufacturers are turning their deal making prowess to raw materials providers in hopes of ensuring adequate supplies and controlling costs" (Aeppel, 2006, A1). The current economic

downturn has also been cited as an important rationale for backward integration. By threatening the economic viability of suppliers, the recession has created a high degree of uncertainty for downstream firms who rely on upstream producers for inputs and raw materials (The Economist, 2009). For both these situations, backward integration represents a defensive strategy to prevent costly interruptions in the supply chain. Such efforts resemble one of the major rationales for the emergence of large, vertically integrated corporations during the late 19th and early 20th centuries (Chandler, 1977).

In addition to ensuring supplies, a recent Wall Street Journal article identifies "control" as an important motive for vertical acquisitions for firms in diverse industries. Live Nation seeks to buy Ticketmaster to have greater control over event promotion and ticketing; PepsiCo purchases Pepsi Bottling Group to capture greater control over beverage distribution; and Boeing merges with Vought Aircraft to gain greater control over manufacturing (Worthen, et.al., 2009). Such claims beg the question why contractual measures failed to provide the requisite "control" for buyers.

The recent flurry of vertical mergers and the awarding of a Nobel Prize in economics to Oliver Williamson in 2009 present a propitious opportunity to assess the explanatory power of economic theory in depicting the vertical boundaries of firms. In looking at these recent mergers, a cogent theory would be able to explain why above firms found pre-merger contractual relationships unsatisfactory while being able to describe how integration addressed those shortcomings. In other words, economic theory needs to conceive firms and contracts as alternative governance structures and discuss the conditions under which each structure would be optimal from an efficiency perspective. Organizational economics generally portrays decisions to integrate (or to outsource) as contingent ones, depending upon the characteristics of the firm (and industry), specific attributes of a transaction and the circumstances of the time. This paper examines alternative approaches within organizational economics in the light of recent empirical experience to see which theories best stand up to scrutiny.

The dominant approaches emphasize transactions costs and agency costs in determining the vertical boundaries of the firm. Both of these approaches see firms as organizational structures that address incentive problems that often plague market-based (or contractual) relationships. This paper argues that the narrow focus on incentives has ignored the role of firms in addressing coordination problems associated with arm's length exchange. Firms often facilitate the coordination of complementary activities along the supply chain that require very different types of know-how. Capabilities theory which stresses the knowledge, skills, and experience embodied within firms contends that it is the transaction costs associated with coordinating these types of activities that best explains the vertical boundaries of firms. In particular, product and process innovations that require simultaneous changes across multiple stages of production often create "dynamic transaction costs" (Langlois, 1992). In these circumstances, firms may find it necessary to integrate these stages of production to reduce these transaction costs in order to implement these innovations successfully.

This paper contends that the capabilities approach best explains the rationale for vertical integration. In doing so, the paper begins by reviewing the transaction cost and agency cost approaches that have dominated organizational economics for the last forty years. It then provides an overview of capabilities theory and its implications for analyzing vertical boundaries of the firm. In supporting the capabilities approach, the paper, lastly, offers a case study looking at vertical integration in the carbonated soft drink industry by analyzing the experiences of Coca-Cola and PepsiCo.

TRANSACTION COSTS, AGENCY COSTS, AND VERTICAL INTEGRATION

The basic insight from the economics of organization literature is that in addition to production costs, one must also consider transaction costs in explaining the economic nature of the firm. The central idea behind the bulk of this literature is that virtually all issues in the economics of organization can be reduced to problems of misaligned incentives attendant on imperfect information or less than perfect human beings. In analyzing these problems, the nature of the production process and all of the costs associated with it *are held constant* in order to focus primarily on *transaction cost* considerations. The methodology of transaction cost economics (TCE) is no more evident than in Oliver Williamson's approach to the specific problem of vertical integration. Williamson contends that: "A useful strategy for explicating the decision to integrate, … is to hold technology constant across alternative modes of organization and to neutralize obvious sources of differential economic benefit" (Williamson 1985, p.88). By adopting this postulate, Klein, Crawford and Alchian (1978) and Williamson (1985) focus on what has become perhaps the central concept in the modern economics of organization: asset specificity.

The logic of asset specificity is simple and is related to the notion of sunk costs. Assets are highly specific when they have value within the context of a particular transaction but have relatively little value outside the transaction. This opens the door to opportunism. Once the contract is signed and the assets deployed, one of the parties to the transaction may threaten to walk away from the agreement unless the threat-maker appropriates a greater share of the quasi rents of joint production. The classic example of opportunism from Klein et al. (1978), which is described in Holmstrom and Roberts (1998):

> involves the dies used to shape steel into the specific forms needed for sections of the body of a particular car model (say, they hood or a quarter panel). These dies are expensive – they can cost tens of millions of dollars. Further, they are next-to-worthless if not used to make the part in question. Suppose the dies are paid for and owned by an outside part supplier. Then the supplier will be vulnerable to hold-up. Because any original contract is incomplete, situations are very likely to arise after the investment has been made that require the two parties to negotiate over the nature and terms of their future interactions. Such ex post bargaining

> may allow the automobile manufacturer to take advantage of the fact that the dies cannot be used elsewhere to force a price reduction that grabs some of the returns to the investment that the supplier had hoped to enjoy (Holmstrom and Roberts 1998, p. 74).

Fear of such "holdup" *ex post* will affect investment choices *ex ante*. If the parties integrate their resources into a single firm where profits are jointly shared, the incentives for unproductive rent-seeking are eliminated. Unified organization would thus-forth select a more productive specialized technology and gain a competitive advantage against the contractual alternative. The difficulties associated with completing arms-length transactions in an environment where specific assets are present results in one explanation for vertical integration. Of course, more detailed contracts are an alternative to vertical integration. Such detailed contracts are in some cases very costly to negotiate because of the inability to plan for every contingency known and unknown *ex ante*.

Once organizations integrate, there is a fundamental transformation of incentives (Williamson 1985). Inside integrated organizations, governance costs of a different sort can generate inefficiencies. Agency problems result from conflicts of interests between agents who are under contract with one or more persons, called the principal(s), who delegate some duty of the organization to the agent (Jensen and Meckling 1992). Because not all actions of the agent are observable, agents may be able to pursue utility maximizing activities that do not serve the interests of the principal(s). For example, a manager might shirk, consume perquisites, and choose investment and operating policies that reduce profits of owners but increase the manager's expected well-being (Brickley et al. 2002).

It is possible to realign the incentives of the agents more closely to those of the principal. The two broad strategies that the principal may pursue would be to offer their agents performance pay or monitor the agents more closely. Consider the following example (Lazear, 2000; Harford, 2008,). Safelite Glass Corporation's new bosses were not happy with the speed at which employees fitted replacement windshields. So, rather than paying employees an hourly wage, they decided to pay them per windshield fitted. And rather than depending on peer pressure to insure quality workmanship, the bosses made the employees fix shoddy workmanship without pay. Productivity soared at Safelite by nearly 50 percent per worker. Half of this effect was because workers tried harder. The other half was because the fastest most skilled workers made much more money and stayed with the firm, while slow, clumsy workers tended to drift way. In the end, the quality of work increased and the number of botched jobs fell.

Each type of agency problem does have a potential solution, but solutions always come at a cost. Agency costs are the sum of the costs of designing, implementing, and maintaining appropriate incentive and control systems and the residual loss resulting from the difficultly of solving these problems completely (Jensen and Meckling 1976). In some instances, the agency cost of realigning the incentives of the principal and the agent become prohibitive. In such a

case, it is Pareto optimal to take the agent's task and relocate it outside the boundaries of the business – that is, outsource the activity. In these instances, contracting at arm's length is the structural setting needed for optimal behavior. For example, outsourcing janitorial services in many organizations lowers agency costs and increases the quality of the service provided.

Both the asset specificity and agency cost explanations of organizational boundaries and optimal contractual design assume production costs of are *held constant*. This *comparative institutional approach* is indeed appropriate in highlighting specific organizational characteristics at a particular moment in time. This simplifying assumption, however, has been over-extended, at least implicitly, in ways that critically obscure the actual mechanisms by which productive knowledge is generated and transmitted in the economy (Langlois 1998).

The emphasis in the economics of organization literature on misaligned incentives obscures the fundamental role that *organizations* play in helping cooperating parties to align not only *incentives* but their *knowledge and expectations* (Langlois and Foss 1999). All recognize that knowledge is imperfect and that most economically interesting contracts are incomplete. But most of the literature only considers the incentive effects of alternative contractual mechanisms, neglecting the role organization plays in coordinating diverse activities (Langlois and Foss 1999).

CAPABILITIES, DYNAMIC TRANSACTION COSTS AND VERTICAL INTEGRATION

In his seminal contribution, G. B. Richardson (1972) defined capabilities as the "knowledge, experience and skills" appropriate to the performance of productive "activities" that need to be completed and coordinated. Furthermore, he categorized activities according to the types of capabilities they require. Two or more activities are *similar* if they require the same productive capabilities. The resource-based view of the firm beginning, perhaps, with Penrose (1959) has illustrated how excess capacity with respect to a given capability provides incentives to expand production in new—but similar—directions. Such a view provides a productive efficiency rationale for firm diversification by engaging in activities subject to *economies of scope*. Although Richardson defines similarity of activities based on the capabilities they require, activities are *complementary* if they contribute to different stages of a coordinated production process.

Richardson points out that the coordination of productive activities may be provided by intra-firm direction, inter-firm cooperation or through market transactions. Complementary activities may reflect standardized production such that arm's length, spot market transacting efficiently coordinates the plans of independent producers in different phases of production. Alternatively, the relatively specialized nature of some complementary activities may require close cooperation between firms. Richardson refers to such activities as *closely complementary*. Richardson concludes that complex networks of cooperation exist "because of the need to

coordinate closely complementary but dissimilar activities" (Richardson, 1972). Richardson argues that the number of complementary activities undertaken by firms usually is limited because they often are dissimilar.

Richardson's analysis implies that the nature of productive capabilities, rather than the transaction costs of markets or the governance costs of integration, determines organizational structure. The process of production itself is fraught with uncertainty, not over agency problems, but about how productive knowledge and routines needs to be coordinated (Langlois and Foss, 1999). The coordinating role of capabilities is embedded in the knowledge and routines that constitute production, and may not be analytically separable from the productive activity itself. Such an orientation opens the door to economic models that take firm heterogeneity seriously. Firm heterogeneity derives from the differences in capabilities among firms.

This does not suggest that transaction cost economics (TCE) lacks explanatory power. Rather, as David Teece has noted, "[i]n order to fully develop its capabilities, transaction cost economics must be joined with a theory of knowledge and production (Teece, 1990). TCE's explanatory power is not independent of the productive capabilities at work within the firm. That is, productive capabilities, to some degree, determine the costs of transacting. By turning the TCE methodology on its head, i.e., by holding transaction costs constant and varying the capabilities required in the production process, one sees that the changing nature of capabilities alone provides a rationale for alternative organizational forms.

Given the limits of firms' productive knowledge, skill, and experience, economic change often poses challenges for the existing array of complementary capabilities. In particular, product and process innovations can create "dynamic transaction costs" that require changes in organization for their implementation. Dynamic transaction costs consist of the "costs of persuading, negotiating, coordinating and teaching outside suppliers…. [or] the costs of not having the capabilities you need when you need them" (Langlois, 1992, 113). It is these dynamic transaction costs associated with economic change that may call for changes in vertical relationships within the supply chain. "When the market cannot provide the right capabilities at the right time, vertical integration may result; and when the firm lacks the right capabilities at the right time, vertical disintegration may occur" (Langlois, 1992, 113) . Systemic innovations which require simultaneous changes in multiple stages of the supply chain may require vertical integration to carry them out. On the other hand, if firms do not possess the requisite capabilities, innovation may lead to vertical disintegration as firms rely on the market to complete the necessary activities. Learning by firms and markets over time creates incentives for altering vertical boundaries as relative capabilities change (Langlois, 1992).

Though TCE and the capabilities view can be construed as complementary, the relationship between the two approaches is an uneasy one, owing to the different ways the two theories have been operationalized. TCE has been exploited as a tool of static optimization. As such, the methodologies it employs reflect the power—and limitations—of neoclassical theory. Economic capabilities, by contrast, derive their explanatory power from plausibility rather than

tractability. Empirical support for the economics of capabilities is most often case-study based, and therefore derives from a context of changing markets. Capabilities reflect production as an innovative process not wholly compatible with static optimization.

CASE STUDY: THE U.S. CARBONATED SOFT DRINK INDUSTRY - COCA-COLA AND PEPSICO

With regard to analyzing decisions to integrate (or disintegrate), history matters. As stated previously, these decisions are path dependent in nature, contingent on circumstances of time and place. The best way to analyze these decisions, we contend, is to examine the particular contexts in which they occurred. This case study looks at the historical experience of Coca-Cola and PepsiCo in the soft drink industry as they implement new product and process strategies. Its focus is on the changing relationship between the two major concentrate manufacturers (Coca-Cola and PepsiCo) and the bottling operations they rely on to manufacture and distribute their products to retailers. The recent decisions by Coca-Cola and Pepsi to vertically integrate with independent bottlers reflect strategies to pursue niche markets through the introduction of new product line extensions. Over the history of Coca-Cola and Pepsi, there have been shifts in the level of integration between these two stages of the supply chain. Much of this history is described in the 1992 article "Strategy and Transaction Costs: The Organization of Distribution in the Carbonated Soft Drink Industry" by Timothy Muris, David Scheffman, and Pablo Spiller. In their analysis, Muris, et. al. (1992) describe the increase in transaction costs between concentrate manufacturers (CMs) and their bottlers that arise from a changing economic landscape. Though these authors do not apply the concept of "dynamic transaction costs" in describing the motivations for vertical integration, their narrative largely supports that interpretation.

The Emergence of a Franchise System

For the first half of the last century, a large number of geographically dispersed, independent franchisees handled the bottling, marketing and distribution of carbonated soft drinks (CSDs). Muris, et al. (1992) argued that market coordination through many independent franchised bottlers was an efficient organizational response to the economic environment of the time. The "value of CSDs relative to shipping costs and the use of returnable (and breakable) containers, soft drink bottling, like dairies, required local manufacturing and a substantial local delivery system…. Given the state of national communications and transportation systems of the time, the management of such a large system of local manufacturing and delivery operations could only be accomplished with an extremely decentralized management structure" (Muris, et al., 1992, 265). The costs of a vertically integrated governance structure were prohibitive,

making the emergence of independent distribution an efficient organizational response to the environment of the time.

Under this arrangement, Coca-Cola and Pepsi-Cola focused on manufacturing concentrate, monitoring bottling operations, and orchestrating national promotional campaigns. They shipped concentrate to bottlers that were widely dispersed around the country. The bottlers invested in and maintained plant and equipment, converted concentrate into carbonated soft drinks in glass containers, and marketed and distributed product to local retailers and soda machines. Coca-Cola and Pepsi sold concentrate to bottlers at a contractually specified price. The bottlers had discretion over the prices they charged their customers. Each bottler served a relatively small geographic area (Muris, et al., 1992).

The relative simplicity of the business fostered the development of a rapidly expanding franchising system between concentrate manufacturers (CMs) and local bottlers. The bottlers as independent franchisees only produced and marketed a few, unchanging beverages in a few, unchanging packages. The terms of the contract between CMs and bottlers successfully addressed the significant sunk investment costs in highly specific capital incurred by bottlers. In the franchising arrangement, bottlers received "exclusive and perpetual territorial rights" to produce and distribute soft drinks. Such rights provided bottlers strong incentives for market development and protection against opportunistic behavior by CMs (Muris, et. al., 1992). The exclusive and territorial nature of the contract prohibited the CM from granting franchises to new bottlers that encroached on the territories of existing bottlers. The perpetual stipulation greatly expanded time horizons for bottlers, giving them greater assurance of recouping their specialized investments in plant and equipment. By providing these safeguards, CMs were able to take advantage of the local knowledge these franchisees possessed. The success of this strategy led to a proliferation of small bottlers throughout the country; by 1950, there were over 6500 bottling plants within the United States alone producing carbonated soft drinks (Saltzman, et al., 1999).

Increasing Scale and Scope

Changes in the economic environment during the second half of the twentieth century created opportunities (and competitive pressures) for both product and process innovations in the industry. Improvements in transportation, the introduction of nonreturnable containers, and advances in technology dramatically increased the minimum efficient scale in bottling operations. The introduction of new products and new packaging by CMs in the 1970s required that bottling operations exploit "economies of scope" in production (Muris, et. al., 1992, 260). The result was a proliferation of new brands and variations on existing brands.

> By 1985, the consumer could purchase Coca-Cola, Caffeine-Free Coke, Coca-Cola Classic, Diet Coke, Caffeine-Free Diet Coke, Cherry Coke, Sprite, Diet Sprite, Tab, Caffeine-Free Tab, Mello Yello, Fanta, Fresca, Mr. Pibb, and others

> in a great range of sizes, in cans or bottles, and in different kinds of vending machines as well as through the restaurant and fast-food trade. The distinction between fruit juice and soft drinks was broken down with the introduction of such products as Minute Maid Orange Soda, in response to Pepsi-Cola's Slice…. [PepsiCo] too had a wide variety of soft drinks: Pepsi-Cola, Diet Pepsi, Mountain Dew, Slice, and others in a truly bewildering variety of packages and with or without various ingredients such as caffeine (Tedlow, 1990, 69).

Coca- Cola and PepsiCo bottlers also added the production of independent brands like Dr. Pepper and 7-UP to their operations in the 1980s (Saltzman, et. al., 1999). Along with changes in production processes, the increase in the number of offerings required "ever more sophisticated use of advertising, particularly television, with a greatly increased pace of change of promotions" (Muris, et. al., 1992, 259). In addition, the rise of retail chains like Walmart and other large accounts called for increasing standardization of terms with respect to price, promotion, and delivery at a national level which challenged the independent marketing decisions of bottlers within their exclusive territories.

The execution of these new product and process strategies as well as adapting to the realities of a new retail environment posed serious problems for the existing franchising system. "In essence, Coca-Cola and Pepsi-Cola needed to change their distribution systems in order to implement effectively, the strategies that were stimulated by the new environment because the relative transaction costs of the independent bottling systems in the environment were too high" (Muris, et. al., 1992, 256). To accommodate increases in minimum efficient scale required bottlers to cooperate and consolidate their operations across existing territories. In response, a number of independent bottlers combined their efforts by creating large, multi-franchise operations (MFOs). The CMs largely found the formation of MFOs to be scattered, slow and inadequate in responding to the new environment. In addition, CMs found that the transaction costs of persuading many independent bottlers to adopt new products and packaging to be prohibitive. "The success of product introductions hinges, first, on the ability of the manufacturer to convince retailers to take on the product and market it effectively and, ultimately, on consumer acceptance. Concentrate manufacturers (CMs) face an additional hurdle in introducing a new product or package – they must convince their independent bottlers to handle the item" (Muris, et al., 1992, 272). These product introductions also required increased local promotional and advertising efforts which bottlers often resisted.

These "dynamic transaction costs" of adaptation prompted Coke and Pepsi to make significant changes to the decentralized distribution system. Both Coke and Pepsi moved to more vertically integrated distribution systems that allowed them greater control in the implementation of these product and process innovations. The excerpt below summarizes these changes.

> Beginning in the late 1970s, Coke and Pepsi started creating captive distribution organizations by acquiring some of their larger independent bottlers. Coca-Cola formed Coca-Cola Enterprises (CCE) as a publicly owned bottling operation with the parent holding a 49 percent interest. Rather than forming a separate publicly traded corporation for its captive bottling, PepsiCo enlarged and revamped its 'bottler of last resort,' Pepsi-Cola Bottling Group (PBG) to manage its captive distribution operations. Coca-Cola (through CCE) and PepsiCo now each bottle about 50 percent of their total bottled sales and have a minority equity interest of about 15 – 20 percent in independent bottlers that accounts for about another 20 percent of sales. Thus, Pepsi-Cola and Coca-Cola each own or have an equity interest in bottlers selling about two-thirds of their volume (Muris, et. al., 1992, 261).

In creating Coca-Cola Enterprises, Coke purchased its two largest independent bottlers and immediately sold 51% interest to the public. The consolidation and integration of bottling operations continued into the 1990s as CCE acquired numerous bottlers including Johnston Coca-Cola Bottling Company in 1991, the second largest independent bottler at the time as well as many bottlers in overseas markets. In the 1990s, CCE reorganized its operations by creating "four operating groups defined by market and along geographic lines" (Coca-Cola Enterprises, Hoovers.com, 2010). In addition to domestic efforts through CCE, Coca-Cola "acquired more than 30 bottlers worldwide from 1983 to 1993" in aggressively expanding into international markets (Coca-Cola Company, 2005). Coca-Cola traditionally has had a much stronger presence in international markets relative to Pepsi, with two-thirds of its sales coming outside of the United States. For Pepsi, foreign markets account for only one-third of its sales.

For Pepsi, the path towards integration and consolidation began with their own company-owned bottling network. In the 1950s, Pepsi purchased several of their own franchisees because of poor performance. "By 1959 Pepsi-Cola was its own bottler in 22 major U.S. markets, including metropolitan New York City, Houston, Philadelphia, Pittsburgh, and St. Louis" (PepsiCo, 2001). Pepsi Bottling Group (PBG), a subsidiary of PepsiCo, administered a growing network of bottlers as the purchases of independent bottlers accelerated in the 1980s. "Acquisitions in the late 1980s totaled more than 80 franchises, including the bottling operations of General Cinema and Grand Metropolitan (then the #3 independent US Pepsi bottler)" (Pepsi, Bottling Group, Hoover.com, 2010). PBG mergers continued into the next decade so that by 1997, "the top 10 US Pepsi bottling operations (including #1 company-owned Pepsi-Cola Bottling) distributed more than 80% of Pepsi's total volume" (Hoover.com). The reorganization of operations along regional lines quickly followed these purchases.

These efforts continued so that by 1998, PepsiCo and Coca-Cola had ownership or equity interests that accounted "for approximately 73% and 77%, respectively, of their U.S. sales" (Saltzman, et. al., 12, 1999). The rationalization of bottling operations quickly followed these organizational changes as the number of bottling plants fell while production volume per plant

increased. Table I below shows changes in the number of bottling operations and the scale of production over time for all U.S. plants.

Table I: Number and Average Production of U.S. CSD Bottling Plants			
Year	**Number Of Plants**	**Total Cases**	**Average Cases Per Plant**
1970	3054	2,971,000,000	972,823
1980	1859	4,930,000,000	2,651,963
1990	807	7,780,000,000	9,640,644
1998	498	9,880,000,000	19,839,357
From Saltzman, Levy, & Hilke, 1999.			

From 1970 to 1998, the U.S. Carbonated Soft Drink Industry experienced an 83.7% decrease in the number of bottling plants. During the same time, productivity per plant as measured in average cases per year increased nearly twenty fold. Table II below shows the changes in number of plants for Coca-Cola and PepsiCo for the years 1983, 1987, and 1998.

Table II: Number of Coca-Cola and PepsiCo Bottlers		
Year	**Coca-Cola Bottlers**	**PepsiCo Bottlers**
1983	319	256
1987	192	180
1998	94	119
From Saltzman, Levy, & Hilke, 1999.		

hese operations also experienced a dramatic increase in the scope of their operations with the introduction of new brands and new types of packaging. "From 1985 to 1993, PepsiCo introduced, acquired, or formed joint ventures to distribute nine beverages, including Lipton Iced Teas, Ocean Spray Juices, All Sports Drink, H2Oh! Sparkling water, Avalon bottled water, and Mug root beer" (PepsiCo, 2001). Similarly Coca-Cola by the mid-1990s had added the sports drink POWERade , the Fruitopia line, Nestea and Nescafe brands of tea and coffee drinks, and Barq's root beer to their line-up (Coca-Cola Company, 2005). The same time period witnessed changes in the composition of packaging of beverages. Table III below shows the types of containers employed by all CSDs for the years 1970, 1982, 1990, and 1998. In 1970, sixty percent of all containers were returnable glass while plastic containers had not been introduced. By 1998, a majority of containers were plastic and glass containers had virtually disappeared from the marketplace. This shift away from glass containers towards plastic and metal cans required significant changes to bottling equipment and operations.

Table III: Container Type (Percentage of Total Volume)							
Year	**Metal Cans**	**Plastic All Types**	**Plastic 20 oz.**	**Plastic 2 Liter**	**Plastic 3 Liter**	**Glass Non-Ret.**	**Glass Return.**
1970	20%	n.a.	n.a.	n.a.	n.a.	20%	60%
1982	36.5%	21.4%	n.a.	19.9%	n.a.	15.7%	26.4%
1990	54.4%	33.6%	0.2%	26.0%	2.8%	11.4%	0.6%
1998	48.3%	50.9%	15.3%	23.2%	4.2%	0.3%	0.4%
From Saltzman, Levy, and Hilke, 1999.							

In addition to explaining the rationale for vertical integration, capabilities theory provides a basis for understanding other organizational changes that PepsiCo initiated at the time. In the late 1990s, PepsiCo set off an extensive, corporate-wide restructuring effort with the intent of having the company focus narrowly on its core capabilities. Over the years, PepsiCo had become a highly diversified firm. In addition to beverages, PepsiCo through its acquisition of Frito Lay in 1965 had become a major player in the snack food sector with popular brands like Fritos, Cheetos, Ruffles, Lay's potato chips, Rold Gold pretzels, Doritos, and Tostitos tortilla chips. Pepsico had also aggressively moved into the fast-food business with purchases of Pizza Hut, Taco Bell, and Kentucky Fried Chicken in the 1970s and 1980s (PepsiCo, 2001).

With arrival of CEO Roger Enrico in 1996, Pepsi narrowed its focus on activities it considered core competences, while spinning off dissimilar, non-core businesses. In communicating his business philosophy, Enrico explained that "I started out here [as CEO] with a sense of limitations, not just opportunities" (Gibney, 1999, 1). He argued that PepsiCo needed to "stick to the things we do well and do them better. Stop doing things we don't do well-no matter how alluring they might seem. And put the power of the entire corporation behind a few big initiatives – ones that really count…. [W]e need to do throughout the corporation exactly what we've been doing for years at our strongest businesses, Pepsi-Cola in the U.S. and Frito Lay" (Venkataraman, 2002, 2).

In 1997, PepsiCo spun off its fast-food division with the sale of Tricon Global Restaurants (PepsiCo, Hoovers.com, 2010). "Success in the restaurant business, it seemed, required a set of skills completely different from those required in the snack and beverage businesses. The restaurant business was far more localized and customer-centric. It was not simply about the prompt delivery of tasty, convenient food" (Venkataraman, 2002, 4). With the restructuring and consolidation of bottling operations largely completed, PepsiCo spun off the Pepsi Bottling Group (PBG) as an IPO for $2.3 billion while retaining a 35% ownership stake. In the deal, PBG retained two PepsiCo officials on its board of directors while also giving PepsiCo the right of approval over it annual operating plans (Pepsi Bottling Group, 2001). PepsiCo's relationship with their bottlers now closely mirrored Coca-Cola's.

These spin offs allowed PepsiCo to focus its efforts in promoting its core beverage and snack-food businesses. The similarity of these two businesses with respect to activities like

advertising, marketing, and promotion within the same retail channels greatly facilitated this change in focus. CEO Enrico "launched an initiative called 'Power of One' aimed to take advantage of the synergies between Frito-Lay's salty snacks and the beverages of Pepsi-Cola. This strategy involved persuading grocery retailers to move soft drinks next to snacks, the pitch being that such a placement would increase supermarket sales. In the process, PepsiCo would gain sales of both snacks and beverages while Coca-Cola could benefit in the latter area" (International Directory of Company Histories, p. 6).

Era of Market Fragmentation

With a strong foundation in place, PepsiCo expanded its product lines in both beverages and snacks outside of their traditional offerings. While soda sales in the 1990s were robust, growth began to slow later in the decade as consumers began to move away from carbonated soft drinks towards other, often more healthy alternatives (Beverage Digest, 2010). In response to this shift in consumer preferences, PepsiCo acquired Tropicana in 1998 with the intent of selling healthier products and tapping into the "morning daypart" category (Venkataraman, 2002, 6). In 2001, it purchased the Quaker Oats Company, bringing in brands like Gatorade which controlled over 80% of the sports drink market and healthier snacks like granola bars, rice cakes, and oatmeal bars. Additionally, PepsiCo bought the South Beach Beverage Company which produced the SoBe brand of non-carbonated soft drinks that featured organic ingredients (PepsiCo, 2001).

By the late 1990s, Coca-Cola similarly looked again to aggressively expand its product line. "Having restructured its worldwide bottling operations …, the firm moved into a new phase of growth based on the acquisition of other companies' brands" (Coca-Cola Company, 2005). Unfortunately, governmental authorities in numerous countries frustrated many of their attempts. "An agreement to buy about 30 Cadbury Schweppes beverage brands – including Canada Dry, Dr. Pepper, and Schweppes – outside the US and France was scaled down because of antitrust concerns. Completed in 1999, the deal also excluded Canada, much of continental Europe, and Mexico" (Coca-Cola Company, Hoovers.com, 2010). Despite these and other setbacks, Coca-Cola dramatically increased its offerings in the first decade of the new century. Coke added new cola-based products with lemon, lime, vanilla and black cherry flavored versions. It also introduced the Dasani brand of bottled water and purchased Mad River Traders and Odwalla which produce teas, sodas and juices. Many of its attempts to expand its product line occurred in foreign markets where Coca-Cola enjoys the bulk of its sales. In 2007, Coca-Cola acquired Glaceau, producer of vitamin water and Fuze Beverages, another producer of teas and juices (Coca-Cola, Hoovers.com, 2010).

The shift in consumers' preferences away from traditional carbonated soft drinks towards these new alternatives accelerated in the 2000s. Not only had sales growth in carbonated soft drinks slowed, U.S. sales volume actually has declined each year since 2004. In 2009 alone,

Coca-Cola and PepsiCo suffered 3.9% and 5.0% declines in CSD volume, respectively (Beverage-Digest, 2010, 1). Per-capita U.S. consumption of carbonated soft drinks in 2009 had fallen 14.8% since their peak in 1998 (Beverage-Digest, 2010, 2). "[N]oncarbonated drinks now make up approximately two-thirds of the beverage market in North America. That figure was about 40 percent a decade ago" (Mitchell, 2009). These changes in consumer tastes forced PepsiCo and Coca-Cola to adapt, yet again, to a rapidly changing economic environment. Both companies responded by introducing a wide array of diverse, non-carbonated drinks. A new set of dynamic transaction costs, however, threatened the ability of Coke and Pepsi in adjusting to new market realities.

Success in the new environment required Coca-Cola and PepsiCo to dramatically increase the number and variety of offerings outside of the traditional CSD category. Profitability depended upon their ability to efficiently supply many, low volume niche brands to meet the demands of an increasingly fragmented market. These new market imperatives created significant challenges for the bottling system. The editor of Beverage Digest, John Sicher sums up these challenges. "The old bottling system was based on a world where there were a relatively small number of carbonated soft drink products that grew every year…. That's what the bottlers know. Everything is changing now" (Warner, 2009, 2). The manufacturing capabilities of bottlers often faced difficulties in producing these new products. "As the industry moves from a heavy reliance on carbonated soft drinks, some soft drink bottlers don't have the equipment to manufacture the non-carbonated drinks and many are sold in small volume" (Cimulluca, et. al, 2010).

The proliferation of new, low volume products challenged "direct store delivery" (DSD), the traditional method of distribution employed by bottlers. In DSD, bottlers deliver beverages directly to the retailer, put them on the shelves, and handle all aspects of merchandising. Bottlers will make frequent deliveries to make sure that shelves are fully stocked and that merchandise is fresh and properly displayed. They often made multiple deliveries each day to large retailers like Wal-Mart. This method has been extremely successful in distributing high volume products like Coke and Pepsi's traditional CSD beverages. The frequent deliveries, restocking, and merchandising efforts associated with DSD, however, are not cost effective for the distribution of many, low volume beverages (Venkatarman, 2002).

Under warehouse distribution systems, product is shipped directly to retailers' warehouses who handle all storage, stocking, and merchandising functions. The warehouse system "is cheaper and more efficient for smaller volume products like teas and water that are growing in popularity" (Cimullca, et. al., 2010, A1). In addition to the popularity of its offerings, the cost advantage of warehouse distribution for newer products partially motivated PepsiCo's acquisition of Quaker in 2001. "PepsiCo's merger with Quaker [Oats] dramatically expanded the company's broker-warehouse distribution capabilities, adding the large and efficient warehouse system used for Quaker and Gatorade products" (Venkataraman, 2002, 12). Additionally, large retailers like Walmart often prefer the warehouse method of distribution to

DSD for lower volume items because it allows Wal-Mart to use its highly efficient inventory management system (Terhune, 2006).

The negative response of small, independent bottlers to attempts by Coca-Cola to introduce warehouse delivery illustrates the "dynamic transaction costs" associated with convincing these bottlers to follow suit. In 2006, Coca-Cola and Coca-Cola Enterprises (which accounted for 77% of Coke's US sales) agreed to ship Powerade, Coke's sports drink, directly to Wal-Mart's warehouses. In return, Wal-Mart agreed to provide additional space for Powerade on its stores' shelves. Wal-Mart already had agreements in place with PepsiCo to ship Gatorade directly to Wal-Mart's warehouses. In February, fifty five small, independent bottlers (responsible for 10% of sales) sued Coca-Cola and CCE for violation of contract with the bottlers (Terhune, 2006). "The standard contract with bottlers said that, except for food service accounts such as restaurants of airlines, the sports drink 'shall not be warehoused delivered by' Coke" though it didn't address delivery by bottlers (Terhune, 2006). According to Chad Terhune, the bottlers' motivation for the suit lay in the precedent this action set for future business dealings. "Their concern is that straight-to-warehouse delivery will prove pleasing to Wal-Mart, that other chains will demand it, and that it would inexorably spread to other drinks and bottlers. The small bottlers then would see their close relationships with grocers diminished, and local marketing would suffer. Those relationships are the main way the bottlers feel they can drive sales in their territories – and thus their own business success" (Terhune, 2006, A1). Donald Knauss, then the head of Coke's business in North America, expressed his frustrations with the bottling system as it existed at the time: "It's about having one system that operates in concert…. We can't keep having internal debates where 20 bottlers want to do it this way and another 35 bottlers want to do it that way. I don't think we can grow unless we adapt to how the customer landscape has changed" (Terhune, 2006, 2).

In August of 2009, PepsiCo announced an agreement to acquire all of the outstanding shares of its two largest bottlers, Pepsi Bottling Group and PepsiAmericas. In describing the impetus for the merger, CEO Indra Nooyi explained that "[t]he fully integrated beverage business will enable us to bring innovative products and packages to market faster, streamline our manufacturing and distribution systems and react more quickly to changes in the marketplace, much like we do with our food business" (de la Merced, 2009). The acquisition of its two largest bottlers "will give Pepsi control over 80% of its beverage volume and is likely to boost the outlook for non-soda brands like Gatorade and Aquafina, which bottlers often overlook" (Warner, 2009). Coca-Cola announced in February 2010 its decision to buy the balance of Coca-Cola Enterprises. Coca-Cola CEO Muhtar Kent explained that "[f]undamental industry forces have altered the consumer, customer and competitive landscape. Our franchise system cannot remain static. We have to create the next generation of high-return opportunities" (McKay, 2010).

Only time will tell if Coca-Cola's and PepsiCo's integration strategies are successful. What is apparent is that the "dynamic transaction costs" that emerged between CMs and their bottlers were major obstacles that impeded the ability of the industry to adapt to a more diverse and fragmented marketplace. The removal of those obstacles was the primary motivation for Coca-Cola and Pepsi to vertically integrate with their bottling operations. While vertical integration in this case may not be a sufficient condition for success, it certainly seems to be a necessary one.

CONCLUSION

Several mainstream economists have become increasingly critical of the traditional transaction cost explanations for vertical integration. Bengt Holmstrom and John Roberts (1998) contend that too much emphasis has been placed on the provision of incentives in explaining the boundaries of the firm. "In negotiating joint venture agreements, venture capital contracts, or any of a number of other business deals, much time is spent on building in protections against hold-ups. At the same time, such contracts are prima facie evidence that hold-up problems do not get resolved solely by integration of buyer and seller into a single party hold-up problems" (Holmstrom and Roberts, 1999, 74). While investments are often specialized and contracts are incomplete, firms have developed many explicit and implicit mechanisms to align incentives in supporting arms-length relationships. In those cases where vertical integration may be the best response to hold-up problems, often it is investments in specialized capabilities that represent the ultimate source of appropriable quasi-rents because of the difficulty in transferring these capabilities in the market (Monteverde and Teece, 1982). Even if hold-up was not a concern in these circumstances, vertical integration may be necessary, arising from the tacit nature of knowledge embedded in these capabilities. It is the problem of qualitative coordination of tasks in a world of heterogeneous capabilities that ultimately determine the boundaries of the firm.

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G7 EQUITY INDEX REACTION TO THE 2008 FINANCIAL CRISIS

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ABSTRACT

The 2008 global financial crisis had far-reaching effects in the international equity markets. While the crisis had its origins in the US mortgage market, the resulting economic impact was widespread. This paper examines the changes in risk, return and cross-market correlation in the G7 national equity indexes before, during and after the 2008 global financial crisis. We find that daily returns of G7 equity indexes dropped more than 0.35% and risk measures more than doubled during the crisis period. Index returns recovered and standard deviations dropped after the crisis, but risk remained above pre-crisis levels. Cross-market correlations indicate consistently lower correlations between the Japanese market and the remaining G7 countries suggesting a persistent diversification benefit in global portfolios.

INTRODUCTION

Shocks to financial markets come in all forms from oil price shocks to monetary tightening. Since the late 1980s, there have been several significant shocks to select markets which were transmitted to other capital markets, the most recent of which started in the 2008 in the US mortgage market. The first signs of the crisis became evident in early 2007 with the Federal Home Loan Mortgage Corporation (Freddie Mac) announcement that it would no longer buy the most risky subprime mortgages and mortgage-related securities. Throughout the rest of 2007 and early 2008, the US Federal Reserve implemented a series of rate cuts and extraordinary liquidity measures to support the markets and cushion the effects of the growing mortgage crisis. On September 7, 2008 the Federal Housing Finance Agency (FHFA) placed Fannie Mae and Freddie Mac into government conservatorship. At the same time, the U.S. Treasury announced the purchase of preferred stock, a secured lending facility and a temporary program to purchase mortgage backed securities (Federal Reserve 2010). One week later, Bank of America announced its $50 billion purchase of Merrill Lynch & Co. and Lehman Brothers filed bankruptcy. The 2008 crisis was similar to the 1997 Asian crisis with its roots in excessive risk in the debt markets (Chatterjee, Ayadi, and Maniam, 2003).

Although the origins of the 2008 financial crisis arguably are based in the US mortgage markets, the results have been far reaching. Each of the G7 countries exhibit negative average daily returns and risk increases during the crisis period. The purpose of this paper is to investigate the changes in risk and return measures for each of the G7 national equity indexes

from January 2006 through March 2010. Additionally, the differences in cross country correlations are used to identify changes in market interactions.

The next section reviews some of the literature relevant to the reaction of global equity markets to financial shocks and the transmission of financial information between world markets. Section 3 describes the objectives of this study and Section 4 describes the G7 data and methodology used. The next section presents the empirical results. Conclusions and suggestions for further research are given in the final section.

LITERATURE

The integration of financial markets and the transmission of economic shocks across markets has been the focus of considerable research for many years. The occurrence of a series of financial crises has provided frequent opportunity to evaluate the reactions of markets to shocks. Much of the previous research stems from an underlying assumption of market efficiency between similar markets. The absence of market integration is interpreted to suggest the availability of a diversification benefit in a global portfolio (Gonzalez-Rozada and Yeyati (2008); Phengpis, Apilado and Swanson (2004)). Changes in market integration during times of crisis provide insight into the pricing of new information across related markets (Caporale, Pittis, and Spagnolo (2006)).

OBJECTIVES

The purpose of this paper is to evaluate changes in market risk, return and cross market correlations before, during and after the 2008 financial crisis. The paper describes return and risk characteristics for the G7 national equity markets for the period January 1, 2006 through March 31, 2010. The 2008 financial crisis period is defined from failure of Fannie Mae and Freddie Mac (September 7, 2008) through the first repayment of the Troubled Asset Relief Program (TARP) (March 31, 2009). The pre-crisis period covers January 2006 through September 6, 2008. Although the financial crisis cannot be considered ended in March 2009, the first redemptions of preferred shares under the Capital Purchase Program of TARP signaled an initial movement toward recovery. The paper utilizes a differences between means model to identify the impact of financial crises on national equity markets risk, return and correlations.

DATA AND METHODOLOGY

The data used consists of daily MSCI index levels for the G7 national equity indices (Canada, France, Germany, Italy, Japan, UK & US) for the period January 1, 2006 through March 31, 2010. The daily returns are calculated as the difference in the natural logs at time *t* and *t-1*. A 2-day average return is evaluated. January 2006 through early September 2007, the pre-

crisis period, was a time of increasing uncertainty in the financial markets. During this period, four of the G7 countries had negative average daily returns: USA, UK, Italy, and Japan. During the crisis period, all seven indexes had negative returns and each index showed positive returns in the recovery period. The US exhibits the lowest standard deviation of returns of the individual countries studied. This is seen in the pre-crisis and crisis recovery periods. During the crisis period, Japanese returns showed the lowest risk, even though Japan had the highest standard deviation in the pre-crisis period. Canadian returns were riskiest in the crisis and recovery periods. The average returns of all indexes are normally distributed (Jarque-Bera) over the full period and each subperiod.

Table 1: Descriptive statistics for each series and time period

This table details the descriptive statistics for the G7 national equity indexes.

	Full Period (N=1171)		**Pre-crisis (N=698)**		**Crisis (N=147)**		**Post-crisis (N=261)**	
Index	**Mean**	**Std Dev.**	**Mean**	**Std Dev.**	**Mean**	**Std Dev.**	**Mean**	**Std Dev.**
Canada	0.0101	1.4171	0.0344	0.8750	-0.3655	2.9588	0.2010	1.2557
France	-0.0227	1.3370	0.0106	0.8678	-0.3439	2.6171	0.1520	1.1454
Germany	-0.0074	1.3191	0.0336	0.8553	-0.3814	2.6050	0.1518	1.1964
Italy	-0.0531	1.3970	-0.0151	0.7804	-0.4265	2.8047	0.1460	1.2317
Japan	-0.0310	1.0983	-0.0285	0.9176	-0.2367	2.0174	0.1103	0.8243
United Kingdom	-0.0250	1.2807	-0.0070	0.8116	-0.3681	2.6577	0.1728	1.0651
USA	-0.0162	1.0547	-0.0015	0.6417	-0.3031	2.2726	0.1497	0.8117

Differences between national means are calculated for the periods before, during and after the financial crisis. T-tests based on equal variances and unequal variances are calculated to determine the statistical significance of the differences. An F-test evaluates the equality of the variances. The results shown are based on equal variances where appropriate and unequal variance otherwise. Additionally, the correlations of the returns for each country pair are calculated for each time period. The Fischer r to z transformation is used to calculate the differences and significances between the correlations.

EMPIRICAL RESULTS

Table 2 shows the mean daily returns and differences between the means for each of the G7 countries in the period before, during and after the 2008 financial crisis. The difference between means represents the chronological difference between means. In particular, the average daily US return in the crisis period was -0.3031 and the average pre-crisis return was -0.0015. The difference between these means, crisis period minus pre-crisis period is -0.3015. This difference indicates that average daily returns fell 0.3015% from the pre-crisis period to the crisis

period. The US mean daily return increased 0.4528% in the crisis recovery period. The third column of differences shows the change from the pre-crisis period to the crisis recovery period. In the case of the US, returns increased 0.151% from pre-crisis to recovery.

Table 2: Mean daily returns and differences between means by period

This table shows the mean daily returns for the G7 national indexes in the pre-crisis (Jan06-Sept08), crisis (Sept08-Mar09), and crisis recovery (Apr09-Mar10) periods. Differences between the means are shown with significance levels.

	Pre-crisis	**Crisis**	**Post-Crisis**	**Crisis minus Pre-crisis**		**Post-Crisis minus Crisis**		**Post-Crisis minus Pre-Crisis**	
Variable	(N=698)	(N=147)	(N=261)						
Canada	0.0344	-0.3655	0.2010	-0.3999	a	0.5665	a	0.1666	b
France	0.0106	-0.3439	0.1520	-0.3545	a	0.4959	a	0.1414	b
Germany	0.0336	-0.3814	0.1518	-0.4150	a	0.5331	a	0.1181	c
Italy	-0.0151	-0.4265	0.1460	-0.4114	a	0.5725	a	0.1612	b
Japan	-0.0285	-0.2367	0.1103	-0.2082	c	0.3470	b	0.1388	b
UK	-0.0070	-0.3681	0.1728	-0.3611	a	0.5409	a	0.1798	a
United States	-0.0015	-0.3031	0.1497	-0.3015	a	0.4528	a	0.1513	a

The global nature of the 2008 financial crisis is evident in the differences between means shown in *Crisis minus Pre-Crisis*. Average daily returns for all of the indexes studied declined during the crisis period. The average decrease in returns was 0.35%, with Germany and Italy exhibiting the greatest drops. All indexes showed sharp increases from crisis to recovery with 4 of 7 posting gains in excess of 0.5%. Returns on the Japanese market were least effected in the crisis period (-0.208) and showed the smallest increase during the recovery period (0.347). Over the entire period, all equity indexes showed increases in daily returns.

Table 3: Cross market correlations, differences and significance

		Pre-Crisis	***Crisis***	***Post-Crisis***	***Crisis minus Pre-crisis***		***Post-Crisis minus Crisis***		***Post-Crisis minus Pre-Crisis***	
		(N=698)	*(N=147)*	*(N=261)*						
FRA	CAN	0.567	0.708	0.761	0.140	a	0.053		0.193	a
GER	CAN	0.543	0.686	0.781	0.143	a	0.095	b	0.238	a
IT	CAN	0.524	0.682	0.757	0.159	a	0.075	c	0.234	a
JP	CAN	0.113	0.324	0.043	0.211	a	-0.281	a	-0.070	
UK	CAN	0.588	0.724	0.751	0.136	a	0.027		0.163	a
USA	CAN	0.562	0.753	0.780	0.191	a	0.027		0.218	a

Table 3: Cross market correlations, differences and significance										
		Pre-Crisis	***Crisis***	***Post-Crisis***	***Crisis***		***Post-Crisis***		***Post-Crisis***	
GER	FRA	0.953	0.926	0.969	-0.027	a	0.043	a	0.016	a
IT	FRA	0.918	0.959	0.961	0.041	a	0.002		0.042	a
JP	FRA	0.198	0.350	0.073	0.152	b	-0.278	a	-0.126	b
UK	FRA	0.917	0.949	0.925	0.032	a	-0.024	b	0.008	
USA	FRA	0.426	0.544	0.680	0.118	b	0.136	b	0.254	a
IT	GER	0.905	0.880	0.933	-0.025	c	0.053	a	0.029	a
JP	GER	0.208	0.307	0.054	0.099		-0.253	a	-0.154	b
UK	GER	0.881	0.875	0.916	-0.007		0.042	b	0.035	a
USA	GER	0.400	0.620	0.682	0.220	a	0.062		0.282	a
JP	IT	0.169	0.365	0.076	0.196	a	-0.288	a	-0.093	c
UK	IT	0.854	0.913	0.886	0.059	a	-0.028	c	0.032	b
USA	IT	0.388	0.495	0.681	0.107	c	0.186	a	0.293	a
UK	JP	0.166	0.355	0.080	0.189	b	-0.275	a	-0.086	
USA	JP	-0.023	0.006	-0.067	0.028		-0.072		-0.044	
USA	UK	0.426	0.542	0.643	0.115	b	0.101	c	0.217	a
Significance levels are: a=1% , b=5% , c=10%; Differences between means represent chronological change										

Cross market correlations and the differences between these correlations are shown in Table 3. The results show evidence of high correlations among European countries and consistently lower correlations between Japan and the remaining G7 members. This persistent relationship may support the availability of a diversification benefit in a global portfolio, even in times of crisis ((Gonzalez-Rozada and Yeyati (2008), Phengpis, Apilado and Swanson (2004)). In the crisis period, cross market correlations generally increased, except between Italy/Germany and France/Germany. Even though these correlations declined slightly, the overall level of correlation remained high. In the crisis recovery period, correlations increased in 14 of 21 pairs and declined in 7 pairs. Interestingly, Japanese pairs accounted for five of the seven drops (Canada, France, Germany, Italy and UK) and the UK was a partner in the remaining two (Italy, France). Over the entire period, all seven Japanese pairs exhibited lower correlations in contrast to all other pairs which reported increased correlations. The largest gains are seen in the US/Italy, US/Germany, and US/France pairs.

CONCLUSIONS

While the 2008 financial crisis may trace its origins to the US mortgage market, the effects have been significant and widespread. The average daily returns of the G7 equity markets demonstrate the far-reaching and consistent impact of the crisis. Equity returns dropped sharply and risk increased for each G7 member during the crisis period. Returns improved and risk declined in the post-crisis period, but risk measures remained elevated above pre-crisis levels in the sample studied. Cross-market correlations for the Japanese market demonstrated a lower level of market integration which reduced even further during this period. One avenue of further research will be to expand this investigation to all G20 nations to evaluate the crisis response in a larger sample of countries.

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CREDIT CARD ACCOUNTABILITY RESPONSIBILITY AND DISCLOSURE ACT OF 2009: HELPFUL FOR 18- TO 21-YEAR-OLDS?

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ABSTRACT

The Credit Card Accountability Responsibility and Disclosure Act of 2009 went into effect April 30, 2010, making it unlawful for a credit card company to sign up an individual under the age of 21 without an adult co-signer, unless that underage individual shows convincing documentation of a means to make adequate payments. The apparent concern is that financial institutions exercise a greater degree of influence over the spending and possible card debt of this younger cohort by providing lines of credit. The purpose of this paper is to test whether college students between the ages of 18 and 21, v. students age 21 and older, will accept or decline a free additional line of credit. Of those who would accept a credit line extension, the paper studies how students would use the additional credit line, if at all. These students already had experience with using credit cards; they were surveyed before the new law went into effect. This study supports the concept that students under the age of 21, through their choices, may be indirectly signaling that they would benefit from controls on credit lines, although not necessarily in the form of legislation, to limit the accumulation of additional debt. A significantly larger number of students under the age of 21 reject an offered line of credit, and the difference in the number rejecting the line increases when the amount increases from $500 to $1,000. Of those accepting the line of credit, a significantly larger number of students under the age of 21 plan to hold the card, not spend with it, in both the $500 and the $1,000 credit extension scenarios – but most do ultimately plan to spend some of the additional credit line. The conclusions are useful for bankers, legislators, academic professionals and students. It affirms (weakly) Congress' restriction of credit to students between the ages of 18 and 21 years. The findings may also impact the decisions made by government educational boards and academic administrators, whose goal should be to ensure that college students have enough cash flow, but not overextend their debt.

Key Words: Credit, Behavioral Economics, Emerging Adolescents

INTRODUCTION

The Credit Card Accountability Responsibility and Disclosure Act of 2009 (CCARD Act) went into effect April 30, 2010 (Library of Congress, 2009). This law, among other provisions, makes it unlawful for financial companies to sign up individuals under age 21 without an adult co-signer, unless the underage individual provides documentation of a means to make sufficient payments. This provision is meant to protect young adults from assuming more debt than they can pay. This study explores whether decisions of college students under age 21 behave differently from older students when offered higher lines of credit. Past research has documented young adults' credit habits and their income growth potential but has shed little light on responses to additional credit access or credit use. This paper examines whether students, under and over the age of 21, would accept additional credit lines and, if so, how these two groups would use it. The survey was conducted shortly before the 2010 law change, shedding light on whether students under age 21 engage in different credit card behavior. This study provides evidence on the usefulness of the CCARD Act. Banks can use this information in marketing to students; and legislators can use this information to better understand younger, less experienced consumers.

LITERATURE REVIEW

Many of the approximately 5.8 million college students throughout the country are repeatedly offered credit cards (Warwick and Mansfield, 2000). They typically are low income producers, but they have discretionary income and expect to earn high incomes in the future. Card issuers anticipate that students will frequently use their cards and carry high outstanding balances (Ericson, 2002).

Psychology literature supports differences between younger and older adults. Arnett (2000) asserts that societal changes at the turn of the 21st century facilitated a psychological stage of development for those age 18 to the late 20s labeled "emerging adulthood." This stage is marked by identity exploration, instability, self-focus and "a sense of possibilities." At the end of this stage, new, often long-lasting relationships are formed. (Arnett, 2000) A borrower obtaining a credit card is about to start a potentially long-lasting relationship that can be beneficial for the borrower and the lender (Fliegel, 2005). Ludvigson (1999) finds that students tend to increase their credit limits throughout the lifecycle. Borrowers without credit cards are not equally able to control their consumption patterns as those with credit. But debt rises significantly and quickly with credit limit increases (Gross and Souleles, 2002; Shubhasis, 2004). Young borrowers face the temptation to spend more than income would justify, incurring high outstanding balances (Silver-Greenberg, 2007). White (2007) suggests that financial pressures dampen rational decision making; borrowers tend to behave as hyperbolic discounters, spending more money

with credit cards than their income warrants, and some of their financial decisions are detrimental (Brown and Plache, 2006).

Early in the lifecycle, consumers have lower credit limits but optimistic expectations for income and credit limit growth (Ludvigson, 1999). College students' behavioral patterns change with earning power and potential wealth accumulation over their expected lifecycle, making them attractive customers for credit card companies (Warwick and Mansfield, 2000). Banks increase college students' credit lines gradually when they consistently show financial stability. Maki (2000) finds that increased consumer credit results in higher consumption. But the debt-consumption relationship is difficult to ascertain because credit lines are non-secured, with flexible repayment, not requiring a student to set aside funds or pledge an asset (Ekici and Dunn, 2006).

Ericson (2002) suggests that students' knowledge of credit card features plays a role in their credit card-related decisions. For debtors borrowing below their limits, buffer-stock models of precautionary saving state that unused credit acts as protection against unexpected financial adversities. Even at low utilization rates, borrowers use more credit when their lines are increased, regardless of outstanding balances, at a fixed-utilization-to-credit-line rate. Even though higher interest rates cause cardholders to rely less on their credit cards when borrowing, borrowers significantly and immediately increase debt when their limits are increased. Therefore, students might exercise financial control by rejecting the additional line to avoid more debt. (Gross and Souleles, 2002) Holding a credit line unused requires self-control; self-control is costly. The greater the threat to willpower, the greater the psychic costs and the more likely that cardholders might turn down additional credit, rather than bear those psychic costs of self-control (Shefrin and Thaler 1992).

HYPOTHESES AND RESEARCH QUESTIONS

This paper questions whether college students in each of the two age cohorts will accept or decline the additional credit. Of those who would accept it, how would they use it, if at all? Neo-classical economic theory suggests the following: Accepting the hypothetical credit line does not cause any financial cost. It provides the student with additional resources for unexpected expenses. Thus it is rational to accept the credit line, whether or not intending to use it. But behaviorally, individuals may exercise self-control over their credit decisions differently. Some are more likely to reject a credit line extension altogether, provided that the opportunity cost of rejecting the line of credit is lower than their psychic costs (Shefrin and Thaler, 2000) and also depending on other factors, including current high outstanding balances, risk-aversion, a negative credit report, and/or low income.

Will College Students Reject the Hypothetical Line of Credit?

Hypotheses 1a through 1d test the acceptance rate of the two age cohorts when offered a credit extension of two different amounts, $500 and/or $1,000, chosen as round numbers that are material but not large enough to be a windfall (Chambers, Spencer and Mollick, 2009). The proportion of students rejecting the credit line is expected to be significantly higher than zero. Stated in alternate form:

H_{1a} *The proportions of students age of 18 to 21 and above 21 rejecting the additional credit line of $500 is significantly higher than zero.*

H_{1b} *The proportion of students 21 and older rejecting the additional $500 credit line is significantly lower than for younger students.*

H_{1c} *The proportions of students age 18 to 21 and above 21 rejecting the additional $1,000 credit line is significantly higher than zero.*

H_{1d} *The proportion of students 21 and older rejecting the additional $1,000 credit line is significantly lower than for younger students.*

Of Those Accepting the Line of Credit, How Many Will Use the Credit Line?

Some may accept the line of credit as a financial buffer, not intending to use it in the near future; others may spend immediately. It costs nothing to accept the line until it is used, with no cost if the bill is paid in full within the grace period. Some credit card companies offer reward programs for those making timely payments. Some credit holders may perceive this as an opportunity to increase their credit score over time, provided they make timely payments on outstanding balances. Hypotheses 2a through 2d assert that a significant number of college students in both age cohorts who accept a $500 and/or $1,000 line of credit actually intend to use a portion of it. To simplify the analysis, it is initially assumed that students who answer "leave the line unused" will *intend* to not borrow any of the additional credit in the short-run. Stated in alternate form:

H_{2a} *The proportions of students age 18 to 21 and above 21 accepting the hypothetical credit line of $500 who plan to use it is significantly higher than zero.*

H_{2b} *The proportion of students 21 and older accepting the hypothetical $500 credit line planning to use it is significantly higher than for students below the age of 21.*

H_{2c} *The proportions of students age 18 to 21 and above 21 accepting the hypothetical $1,000 credit line planning to use it is significantly higher than zero.*

H_{2d} *The proportion of students 21 years of age and older who accepted the $1,000 hypothetical credit line who plan to use it is significantly higher than for students below the age of 21.*

Of Those Accepting the Credit Line, How Will They Spend the Money?

This study explores research questions concerning whether students adhere to their intent to either spend or leave the credit line unused. If used, this study measures how they would spend additional credit across different spending categories.

RQ_1 *For both age cohorts, of the credit line students expressly intend to spend, how much will be spent on 1) personal expenses, 2) school expenses, 3) infrequent expenses, 4) durable assets, 5) to pay down notes payable?*

RQ_2 *For both age cohorts, of the students initially saying that they would not spend the additional line of credit, how many indicated later in the survey that they would spend some of the line on one of the 5 categories in Research Question 1 above (versus all on category 6, hold the credit line open for emergency use)?*

METHODOLOGY

Data Collection

A survey was the most practical method for gathering current, meaningful and complete data. This survey contains 18 questions, most developed for this paper, plus demographic questions. It was distributed to undergraduate and graduate students at an urban public university in the Southwest USA. Some students were given a minimal amount of extra credit in their classes for filling out the instrument, and others were approached individually for voluntary participation.

The instrument asked if, when offered a hypothetical credit line extension of $500 and then $1,000, whether the student would (a) reject the credit line, (b) accept the credit but not plan to use it, or (c) accept and use the credit line. Those respondents who would accept the line of credit were asked how they would divide the credit line among the following items, adapted from Chambers and Spencer's (2008) scale: (1) personal - entertainment, clothes, rent, car expenses, groceries, shopping, etc.; (2) monthly school expenses; (3) hold for infrequent expenses; (d) buy a durable asset; (e) pay off debt; and/or (f) hold for emergencies.

Acceptance or rejection of an additional credit line is based on several potential determinants, including current credit balances, timing of the credit supply, account credit score, line size, knowledge of credit cards, credit card features, perception of credit line, financial stability, and credit line spending behavior.

Concerned that some respondents may have interpreted certain survey questions differently, the survey format and wording were revised; a second, smaller administration of this revised survey was run on an additional 37 respondents. (Students in the second group of respondents were approximately one grade level higher than the first group, but this did not seem to affect the results.) No significant differences were found between the first and second survey administration, except as noted in the results and discussion sections.

Data Analysis

Accepting the hypothetical line of credit was coded as "1," and rejecting it as "0." Accepting the credit line was further divided into two groups: intending to leave the line unused given a value of "0," and intending to use it, "1." The data were analyzed using descriptive statistics. In the case of hypotheses 1 and 2, rejecting either credit line was given the value of "0." All other answers to those questions were given the value of "1." $H_{1a \text{ through } d}$ examined whether a significant number in the two cohorts rejected the lines of credit; $H_{2a \text{ through } d}$ examined whether a significant number would accept but intend to hold (not use) the lines of credit. Because some mistakes may be made, a rejection by all respondents is not expected; *a priori* predictive value of 10% acceptance rate and use rate are used to account for human error. The actual error rate for a $p \leq 0.05$ significance is then measured to test sensitivity. Three additional questions identify how students would spend the credit lines and whether they adhere to their initial assertion concerning use of the credit line. Responses were evaluated using frequencies in order to answer Research Questions 1 and 2.

In running the data, the control variables were regressed against the outcomes for both rejecting the credit and holding (but not using) the credit. Once we established the control data did not matter (except where noted in the results and discussion sections), we re-ran data without the variables that did not add significantly to our model.

Of the 191 surveys, only 177 were complete and usable. Of these, 139 (79%) answered that they currently hold at least one credit card in their own names. According to Nellie Mae

(2004), the national average for undergraduates that began the school year with credit cards was about 76%, similar to this sample. The remaining 38 surveys were not analyzed because students without credit cards under their own names could show different behavior (Ericson's dissertation, 2000). Two were eliminated from age analysis because those respondents did not indicate age.

RESULTS

Will a Significant Number Accept a Credit Extension? If So, Will They Spend It?

As shown in the binomial test (Table 1), when students were asked if they would extend their credit line by $500, 49 out of 139 (35.3%) *rejected* the credit line, a rate significantly higher than zero at p = 0.01, even allowing for a 10% error rate on the part of respondents. (At both the $500 level and the $1,000 level, students who accept the line, but hold, rather than use, the line and students who accept and immediately use the credit line were put together under the "accept the credit line" category. At the $500 level, the probability of rejecting credit in aggregate P(r) = (139!/49!90!)(.1^49)(.90^90), where 0.10 is the expected rejection rate.) The error rate yielding a $p \leq 0.05$ significance would have to be just over 38% for these results to be the product of human error rather than intent. As shown in Table 1, the calculated error rates for the groups range from 33% to 50%. Both age groups have a rejection rate significantly higher than zero at $p \leq 0.01$. Hypothesis 1_a is supported. The rejection rate for the younger age group was not significantly different than for the over 21 age group, which leads to rejecting Hypothesis 1_b. With a credit line extension of $1,000, the proportion of students who rejected it increased from 35.3% to 46.0% (64 students). By age group, 37 of 64 (57.8%) of those under 21, and 27 of 73 (37.0%) of those over 21, rejected the credit line. Again allowing for a 10% error rate, the data were significantly higher than zero at p = 0.01, in aggregate and for both age groups; Hypothesis 1_c is supported. The difference in rejection rate between the 18-21 age group and the over 21 age group was marginally significant at $p \leq 0.07$; Hypothesis1_d is marginally supported. (See Table 1.)

The higher credit line rejection at $1,000 came primarily from one group: Those between 18 and 21 years of age increased their rejection rate for credit lines from 40.6% to 57.8%, while those accepting the line but leaving it unused decreased from 56.3% to 39.1%; those who answered they'd use the credit line is still 3.1%. The difference is marginally significant at $p \leq 0.08$ at the $500 level, but not significant at the $1,000 level. This may indicate that younger users view $500 to be a material amount of credit, whereas older students viewed this amount as less material. When regressed, age was not a significant predictor of whether a student would accept the credit line at either $500 or $1,000, (marginally significant, $p \leq 0.07$ at $1,000).

Table 1: Students' Responses When Offered a Line of Credit Extension of $500 and $1,000 Respectively (in Percent)				
Aggregate Response	$500 Line of Credit Extension		$1,000 Line of Credit Extension	
a. Use the Credit Line	N=12**	8.6%	11	7.9%
b. Leave line unused	78	56.1%	64**	46.0%
c. Reject Credit Line*	49	35.3%	64	46.0%
Total **	139	100.0%	139	100.0%
Error rate a $p \leq 0.05$	38%		42%	
Respondents Age 18 - 21				
a. Use the Credit Line	2	3.1%	2	3.1%
b. Leave line unused	36	56.3%	25	39.1%
c. Reject Credit Line*	26	40.6%	37	57.8%
Total	64	100.0%	64	100.0%
Error rate a $p \leq 0.05$	33%		50%	
Respondents Over 21				
a. Use the Credit Line	8	10.9%	9	12.3%
b. Leave line unused	42	57.6%	37	50.7%
c. Reject Credit Line*	23	31.5%	27	37.0%
Total	73	100.0%	73	100.0%
Error rate a $p \leq 0.05$	39%		44%	
*One-tailed significance for a binomial test assuming a 0.10 *a priori* rejection rate is $p \leq 0.001$ for both extended credit line amounts. A sensitivity test allows approximation of what the actual error rate would be if assuming completely rational respondents. Those amounts are listed below the Total lines.				
**Two respondents who would use the credit line did not list age and are omitted from analysis.				

Those above 21 years of age also increased their rejection rate, from 31.5% to 37.0%, with the difference coming primarily from those who said they would accept the line of credit but not spend it. Their increased rejection rate was much smaller than that of the younger cohort; more than half of those over 21 accepted both lines. Older students might have more reasons to accept and a greater ability to pay for credit extensions more than their younger counterparts: more expenses, less parental support and perhaps even supporting their own families. But those over 21 intending to use the $500 ($1,000) credit line are only 10.9% (12.3%). Those who said they intended to accept the line but leave it unused declined from 56% to 46% when the credit line increased from $500 to $1,000.

Measuring Intent to Use

Younger students accepting the credit line are more likely to intend to hold, rather than use it. Of the younger cohort, 25 (39.1%) intended to leave the $1,000 line unused, and 2 (3.1%) intended to spend it. Of those older, 37 (50.7%) intended to leave the line unused, and 9 (12.3%) intended to spend it. As shown in the binomial test in the top two panels of Table 2, the data were significant at $p = 0.01$. The results in the third and fourth panels, by age for students

accepting or rejecting a $500 credit line, were also significant at p = 0.01, indicating that the proportion of students spending the credit card extension of $500 is significantly higher than zero.

Table 2: How Many Students Intend to Use the Credit Line?				
Students Accepting the $500 Credit Line – in Aggregate				
Category	N	Observed Proportion	Test Proportion	Significance (1-tailed)
Leave Line Unused	78	.8533	.1000	.000*
Use the Credit Line	12	.1467		
Total	90	1.0000		
Students Accepting the $1,000 Credit Line – in Aggregate				
Category	N	Observed Proportion	Test Proportion	Significance (1-tailed)
Leave Line Unused	64	.8667	.1000	.000*
Use the Credit Line	11	.1333		
Total	75	1.0000		
Students Accepting the $500 Credit Line – Ages 18 - 21				
Category	N	Observed Proportion	Test Proportion	Significance (1-tailed)
Leave Line Unused	36	.9474	.1000	.000*
Use the Credit Line	2	.0526		
Total	38	1.0000		
Students Accepting the $500 Credit Line – Ages Over 21				
Category	N	Observed Proportion	Test Proportion	Significance (1-tailed)
Leave Line Unused	42	.8400	.1000	.000*
Use the Credit Line	8	.1600		
Total	50	1.0000		
Students Accepting the $1,000 Credit Line – Ages 18 - 21				
Category	N	Observed Proportion	Test Proportion	Significance (1-tailed)
Leave Line Unused	25	.9259	.1000	.000*
Use the Credit Line	2	.0741		
Total	27	1.0000		
Students Accepting the $1,000 Credit Line – Ages Over 21				
Category	N	Observed Proportion	Test Proportion	Significance (1-tailed)
Leave Line Unused	37	.8043	.1000	.000*
Use the Credit Line	9	.1957		
Total	46	1.0000		

Similar results are obtained when the amount is $1,000. Sixty-four (86.7%) of 75 students said they intended to leave the line unused. Hypothesis 2_a and 2_c are supported, but Hypotheses 2_b and 2_d are not. These results indicate that when offered a credit line extension, those of age 21 and older did not seem to materially differ in terms of credit usage from those of under the age of 21. See Table 2.

The number of students who said they would use the line of credit at both the $500 and $1,000 levels was low, with 12 (14.7%) of them accepting the $500 line intending to spend the money and 11 (13.3%) of those accepting the $1,000 line intending to spend it; proportions for both credit amounts are not statistically different. For the $500 level, respondents over 21 who intended to use the line expected to spend almost 48.9% of it immediately or soon, leaving the rest unused. However, it appears that many students in both groups who say they do not intend to use the additional line of credit would actually start spending immediately, as shown in Table 3. With these small numbers at both levels of additional credit, caution must be exercised in interpreting the data.

Table 3: How Students, Those Who Plan to Use and Those Who Plan to Leave the Line Unused, Expect to Allocate Additional Credit

Credit Amount	$500				$1000			
Age*	18 to 21		21 and older		18 to 21		21 and older	
First Response**	Use	Leave Unused	Use	Leave Unused	Use	Leave Unused	Use	Leave Unused
Sample Size	2	36	8	42	2	25	9	37
Actually Leave Unused***	0.0%	52.4%	51.1%	60.7%	50.0%	63.4%	55.5%	67.1%
Actually Use ***	100.0%	47.6%	48.9%	39.3%	50.0%	36.6%	44.5%	32.9%
Personal Expenses	-	18.5%	22.5%	12.5%	-	15.0%	13.3%	3.9%
School Expenses	-	15.8%	5.0%	5.5%	-	9.4%	16.7%	8.7%
Infrequent Expenses	-	3.7%	6.3%	12.1%	-	2.8%	7.2%	10.8%
Durable Assets	-	1.7%	3.8%	0.7%	-	1.2%	2.2%	4.9%
Pay off Notes	-	7.9%	11.3%	8.5%	-	8.2%	5.1%	4.6%

*This sample size excludes two participants that did not provide age

**Students' first response represents the immediate decision students make when offered a line of credit extension.

***Students' second response is computed by the actual allocation of the additional credit among all the items.

To Use or Not to Use the Line of Credit

As a validation check, those who said they did not intend to use the money were asked how they would spend it, with an option to leave the entire line unused. Those who intended to leave it unused apparently did not intend to leave it entirely unused. The 18- to 21-year-olds who said they would not use the $500 line intended to use 47.6%. For those 21 and older, 39.3% would be used. When the 18-to-21-age respondents were offered the $1,000 credit line, those who answered that they intended to leave it unused then indicated 36.6% allocated to spending.

Given this disconnect between intent to *not* use and then intent on *how* to use, further analyses were conducted on how those respondents would spend it. While the number who said they would *spend* the credit line is very low for data analysis purposes, especially for those 21 and older, the number who said they would *accept but not use* the line of credit is reasonably robust for data analysis for both age cohorts. See Table 3.

Of Those Using the Line of Credit, How Do They Spend It?

Looking across the rows of Table 3, one observes differences, in both age cohorts, between the group intending to spend and the group intending to leave the credit line unused. The amount respondents intended to spend on themselves varied between 3.9% ($1,000 level) and 22.5% ($500 level).

Respondents age 21 and older who intended to spend the credit line would increase the amount spent on school expenses from about 5.0% ($500 level) to 16.7% ($1,000 level); those who intended to leave the credit line unused expected to spend only about 8.7% for school expenses at the $1000 level. Those who intended to leave the line unused lowered the percentage for school expenses from 15.8% ($500 level) to 9.4% ($1,000 level). For the $1,000 credit extension, those who intended to leave the credit line unused increased the percentage and amount spent on durable assets, from 0.7% to 4.9%.

Other Findings

Concerning existing lines of credit, 44.3% responded that theirs range from $0 to $1,000, with 32.0% between $1,001 and $2,499 and 9.6% above $2,500. On average, 66.9% chose "establish my credit history" as the main reason for having credit cards. Another 42.8% responded: "I meet emergency needs." - Students were given the choice to mark multiple answers as appropriate. In the second administration of this survey, one year after the original, more students (68% v. 43%) chose "I meet emergency needs." As the national economy worsened sharply between administration times, the latter group may have either experienced or been more acutely aware of economic emergencies. - By age, 65.6% of those under age 21 listed "establishing credit" as the reason for accepting credit cards; only 43.8% of those over 21 listed "establishing credit" as the reason for acceptance, likely because they had already established credit.

Most students (55.9%) carry outstanding credit card balances of less than $500; 35.6% pay their balances in full each month; 28.7% pay more than the minimum but less than the total; for 22.6% it varies monthly; and 14.7% usually pay the minimum. (In the second administration of this survey, the number of people knowing their balance dropped from 2.28 to 1.59 on a scale of 1 to 5. Additionally, fewer were certain of the interest rate that their cards carried and the number of cards held dropped significantly from 1.84 to 1.24. This difference may be

attributable to having had banks reset rates frequently in response to a worsening national economy.)

Table 4: Why Students Obtained a Credit Card

Age	Establish Credit History	Meet Emergency	Become Financially Responsible	It is Convenient	Promotional Advantages	Other Reasons	Total
18 to 21	42 (65.6%)	10 (15.6%)	5 (7.8%)	2 (3.1%)	1 (1.6%)	4 (6.3%)	64 (100.0%)
21 and over	32 (43.8%)	13 (17.8%)	6 (8.2%)	5 (6.8%)	3 (4.1%)	14 (19.2%)	73 (99.9%)
Total	74 (54.0%)	23 (16.8%)	11 (8.0%)	7 (5.1%)	4 (2.9%)	18 (13.1%)	137 (99.9%)

Approximately 66.4% of those who pay in full do so without parents' help, though 34.6% sometimes expect parental help. The numbers were taken from the first administration of the instrument. In the second administration of this survey, the number expecting help from parents rose significantly, perhaps because the economy worsened during this time, or perhaps because college costs continued to rise.

The respondents are optimistic about their finances after college; roughly 94.1% expect to be financially stable or better off. However, acceptance of the $500 credit line was not significantly related to expectations about their financial future.

Gender results were also analyzed; 58.4% (n = 52 of 89) of those accepting the line of credit of $500 were female, and 41.6% (n = 37 of 89 accepting) male. At the $1,000 level, the proportions changed: males accepting the line of credit accounted for 51.4% (n = 38 of 74 accepting the line); females accounted for 48.6% (n = 36/74). (One respondent did not declare gender, which is why the sample does not add to 139.)

The influence of a student's extant credit limits was analyzed at both the $500 and $1,000 levels. The decision to accept/reject a $500 proposed credit line extension was not influenced by current limits for either age cohort. The effect of existing credit limits on a $1,000 additional credit line approaches significance with $p \leq 0.10$. Therefore, existing credit line size may influence the decision to accept credit lines of more than $1,000, especially to those under age 21.

To understand the reasons for acceptance/rejection of the credit line better, we also ran logit on the $1,000 model. No variable was significant in rejecting that amount, but there were significant variables for acceptance. Those accepting the card were in the three income levels between $20,000 and $80,000. Income levels above and below this range were not significant predictors of acceptance. Acceptors were in there first two years of college and did not receive scholarships.

At the $500 level, the two significant predictors of declining the additional credit were: 1) respondents expecting to be "financially stable" (v. better off, the same, or worse off) after college, and 2) those receiving scholarships. The sole significant predictor of accepting the additional limit was income in the $60,000 - $80,000 range.

DISCUSSION

Although results differ in magnitude between the two age cohorts, both make similar decisions. As expected, the proportion of students rejecting the credit extension is significant, with some students not increasing balances to finance short-term needs. At both $500 and $1,000, students significantly accepted the lines but stated they did not intend to use them. However, the results also indicate that both groups underestimate how much they will use the credit line *if* they accept; most will borrow at least some of the additional credit line. The number of students planning to leave the line mostly unused vastly exceeded the number that claimed they intended to *immediately* use it. Results suggest they allocate between use and leaving unused the additional credit line extension, confirming Gross and Souleles (2002).

No significant relationship was found between the existing credit limit and accepting a new credit line of $500. However, the p-value dropped to 0.099 at the $1,000 offer, perhaps indicating that an even higher credit line offer of perhaps $1,500 or $2,000, would produce significant results.

Age Matters

Relative to older students, the 18-21 respondents approach credit with more caution, being more likely to reject additional credit lines and significantly more likely to intend to merely hold the credit line if they do accept it. The intent to *not* spend it is consistent with recognizing the temptation that a credit card presents and the need for either internal or external controls (Shefrin and Thaler, 1992). As respondents mature, their behavior patterns change, consistent with moving from the stage of "emerging adolescence" (Arnett, 2000). Older students were more likely to accept the credit limit, and in particular older students in their first two years of college were more likely to accept the additional $1,000 credit line. This may be because older students feel ready to handle the financial temptation, plan for the financial constriction of the remaining three- to four- years of additional tuition, or have more personal financial oblications like homes and families. The new law may provide external controls on credit cards issuers, designed to do what emerging adolescents themselves try to do on their own.

Size of the Credit Line Extension Matters

The $500 additional credit line is less likely to be rejected, by either group. The $500 amount possibly represents a materially smaller risk of financial irresponsibility than $1,000. The small additional credit line wields higher usage rates: When the amount is doubled, marginal

spending rates decrease, consistent with buffer stock models. Both acceptance and rejection of the $500 and $1,000 credit lines are significantly greater than zero. How the line is spent changes with size. For respondents intending to spend a line of $500, a portion of it would be used for notes payable, which essentially converts fixed debt into a more flexible, revolving debt, perhaps with a lower monthly payment.

When the credit line is $1,000 and respondents intend to leave it unused, the percent spent on oneself is less than half, consistent with Shefrin and Thaler (1992). Similarly, these students would save nearly double for a durable asset, consistent with the prices of many durable assets. Finally, respondents who intend to spend the credit line expect to spend roughly twice as much on school expenses as those who intend to leave it unused. Perhaps this finding reflects the increased need for immediate cash, as the costs of tuition and books for students rise sharply.

Income Matters, but the Relationship Is Not Linear

At the $500 level, those within the $60,000 - $80,000 income range were significantly more likely to accept the credit line; no other income levels were significant predictors of accepting an additional $500 credit limit. At the $1,000 level, the range of significant income expanded to $20,000 - $80,000. Perhaps the higher the credit limit, the harder it is for people of moderate income to resist. Respondents with higher income levels did not tend to accept the additional credit lines more often, perhaps because they had other, adequate sources of funds. Respondents with lower income levels did not tend to accept the additional credit lines more often, supporting the notion that they may be resisting temptation when their financial circumstances would appear to not provide much room for repayment of debt. This relationship deserves extended research. Another source of income, having received a scholarship, was also significant. At the $500 limit, those receiving a scholarship were significantly more likely to reject the credit line; at the $1,000 level, those not receiving a scholarship were significantly more likely to accept the credit line.

CONCLUSION

The amount of an additional credit line is a significant predictor of whether the card will be accepted by college students, both under-21 and 21-and-older cohorts; offering too much credit increases the credit line *rejection* rate. But the amount does not significantly influence the intention to use the credit line once accepted, at least for credit extensions of $500 and $1,000. College students, many being liquidity-constrained, seek optimal credit line sizes to handle short-term obligations. The new law is designed to help those between the ages of 18 and 21 avoid costly credit mistakes, by further regulating the companies that issue such credit. This study supports the concept that students under the age of 21, through their actions, may be indirectly signaling that they want controls on credit lines to limit their exposure to temptation. Deciding to spend a hefty portion after indicating they would not spend gives further indication that an external locus of control is beneficial. Requiring proper monitoring from a co-signer and/or

demonstration of financial responsibility may help emerging adolescents exercise responsible credit practices while they continue to mature.

Therefore, the conclusions derived from this research are useful for bankers, legislators, academic professionals and students, as well as government educational boards and academic administrators - whose goal should be to ensure that college students have enough cash flow, but not get into major credit card debt.

LIMITATIONS AND FUTURE RESEARCH

It is possible that the responses from this small sample taken from one university may not reflect choices that would be made by the entire population of college students. Therefore, replicating the survey with more students on other college campuses and in other regions of the country would be advisable before drawing broad conclusions. Unfortunately, future sampling will not include equivalent subjects under age 21, with the CCARD Act now in place.

A very interesting result was the change in rejection rate amongst younger students between the $500 credit line and the $1000 credit line. Results indicate that adding increased amounts of the hypothetical credit line extension to the survey, perhaps of $1,500 and $2,000, or perhaps even $5,000 and $10,000, would be useful for determining whether, and to what extent, the results might be sensitive to higher credit line offers. Additional lines of credit that are materially higher might yield significantly different results for both cohorts.

When students intended to spend some and save some, they seemed to answer the question according to whether they would save more than they spent or vise versa. This oversimplified response calls for further examination of respondents' interpretation of the question being asked, and perhaps a different way of stating that question. Future research should focus on the development of behavioral theories that could explain which factors make students leave their lines unused rather than spend the additional credit, and vice versa.

Students' acceptance rate of a $1,000 credit extension was significant when regressed against students' future financial expectations. However, the explanatory power of the expectations variable was extremely small. Future research should consider including future financial expectations in predictive models, but perhaps at higher credit extension limits.

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APPENDIX

CREDIT CARD SURVEY (Revised)

1. Do you have a credit card? □ Yes □ No

***2. Why* do you have a credit card? (Check all that apply):**

___ a. To establish credit history	___ b. To meet emergency needs
___ c. To become financially responsible	___ d. It is convenient
___ e. For promotional advantages (bonus points, discounts, rebates, etc.)	___ f. other reasons (list): _____

3. Approximately what is your current credit card balance?

□ $0-$500 □ $501- $1,000 □ $1,001-$1,500 □ $1,501-$2,000
□ $2,001-$2,500 □ $2,500+

4. About what percent of your credit card bill do your parents pay?

□ 0%-25% □ 25+%-50% □ 50+%-75% □ 75+%-100%

5. How much do you usually pay toward your credit card balance due?

□ I usually pay the minimum required □ I usually pay full balance
□ I usually pay more than the minimum but less than the total

6. If you could not make the minimum payment required, how sure would you be that your parents will help you out?

□ Very sure they would help me □ Unsure whether they would help me
□ Sure they will not help me

Please choose the best answer.

	YES	NO
7. Do you know what credit card interest rate you are being charged?		
8. Do you know what APR stand for?		
9. Do you know what your credit card grace period on purchases is?		
10. Do you pay annual fees in your credit card?		
11. Do you regularly check your monthly credit card statement?		

12. What is your line of credit (limit amount on your credit card)?

□ $0-$500 □ $501- $1,000 □ $1,001-$1,500 □ $1,501-$2,000
□ $2,001-$2,500 □ $2,500+

13. If you were offered an additional line of credit of $500, what would you do?

□ Reject the credit extension □ Accept the credit but not use it □ Accept & use the credit

14. If you'd accept the $500 line of credit, how would you spend your money (if at all)?

1. For personal expenses (e.g. entertainment, clothes, living expenses)	
2. For school expenses (e.g. school books, tuition, loans)	
3. For an infrequent expense (e.g. vacation, bigger holiday gifts)	
4. Use to buy a durable asset (e.g. car, washing machine, furniture)	
5. Use to pay off notes (e.g. mortgage, car note, pay other credit card)	
6. Hold it for emergencies	
Amount must total $500	**$500.00**

15. If you were offered an additional line of credit of $1,000, what would you do?

□ reject the credit extension □ accept the credit but not use it □ accept & use the credit

16. If you'd accept the $1,000 line of credit, how would you spend your money (if at all)?

1. For personal expenses (e.g. entertainment, clothes, living expenses)	
2. For school expenses (e.g. school books, tuition, loans)	
3. For an infrequent expense (e.g. vacation, bigger holiday gifts)	
4. Use to buy a durable asset (e.g. car, washing machine, furniture)	
5. Use to pay off notes (e.g. mortgage, car note, pay other credit card)	
6. Hold it for emergencies	
Amount must total $1,000	**$1,000.00**

17. Paying off credit cards is (check one of four choices, or all that apply):

□ Spending □ Savings □ Neither spending nor savings □ Both spending and savings

18. How financially well off do you expect to be after college?

□ Much better than now □ Somewhat better than now □ No better or worse than now
□ Somewhat worse than now □ Much worse than now

19. General Information

Age: _____ Gender: M F **Major:_____**

Ethnic classification (i.e. white, black, Hispanic, other)_____

Academic year qualification (i.e. freshman, junior …,)_____

Do you work? ____ yes ____ no If so, how many hours/week on average? _____

Do you have a student loan? ____ yes ____ no **Do you have scholarships?** ____ yes ____ no

Do you hold at least one credit card under your OWN name? ____ yes ____ no

If yes, how many? _____

20. What is your family's current annual income? (Approximate range)

□ <$20,000 □ $20,000-$39,999 □ $40,000-$59,999 □ $60,000-$79,999
□ $80,000-$99,999 □ $100,000-$119,999 □ $120,000-$139,999 □ $140,000+

STUDENT CHARACTERISTICS, PEER EFFECTS AND SUCCESS IN INTRODUCTORY ECONOMICS

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ABSTRACT

This research presents two important pedagogical findings. First, the regression model developed in this study demonstrates that high school grade point average, math entrance score on the Scholastic Aptitude Test, and enrollment in the Honors College at Western Carolina University were all statistically significant predictors of student achievement in principles of economics classes at this university. Conversely, gender, one of the explanatory variables in the model, proved not to be statistically significant. Second, a t-test of means revealed that there were positive and statistically significant peer effects for Honors College students who were enrolled in Honors College classes. Specifically, honors students in honors classes had significantly higher test scores than honors students in non-honors classes.

INTRODUCTION

This purpose of this study is twofold. First, it examines the student characteristics that are most likely to lead to student success in introductory courses in economics, as measured by exam scores. Special attention was given to student aptitudes as measured by high school grade point average (GPA) and college entrance scores—measured by verbal and math scores in the Scholastic Aptitude Test (SAT)—and gender. Second, the study examined whether or not peer effects exist at the individual class level between honors students who are enrolled in strictly honors sections versus honors students who are enrolled in non-honors sections of principles of economics.

This research approaches peer effects uniquely in that they are examined at the individual section level. The study first employs regression analysis to identify the important determinants of student success in principles of economics classes. Secondly, two tests of means are employed to ascertain whether or not there are peer effects for Honors College students based on whether they were enrolled in an honors only section of principles of economics or in a section open to all undergraduate students.

PREVIOUS RESEARCH

In previous pedagogical studies of student traits that contribute to success in introductory principles of economics courses, researchers have focused on various student characteristics,

such as math aptitude, verbal aptitude, and gender as possible predictors of student achievement in these classes. With respect to student aptitude, Durden and Ellis (1995) found that the math entrance score of the SAT was significantly related to student success in economics. Williams, Waldauer, and Duggal (1992) found that Math SAT scores were positively related and statistically significant to success in non-essay economics tests. In a comprehensive study of college in the United Kingdom, Lumbsden and Scott (1987) reported that achieving an "A" understanding of mathematics contributed significantly to student success to multiple-choice exams in economics. Using their own test for math skills, as well as American College Testing (ACT) math entrance scores, researchers Ballard and Johnson (2004) found that math skills were a statistically significant predictor of student success on economics exams. In the same study, they also found that ACT verbal entrance scores to be significantly positive indicators of success in economics tests.

Several studies have explored whether or not there is a statistically significant difference between the performance of male and female students on economics exams. Some research has concluded that females do not perform as well as their male counterparts in economics classes, at least those that employ multiple-choice questions to assess student performance. Studies that support this conclusion include Anderson, Benjamin, and Fuss (1994), Lumbsden and Scott (1987), and Siegfried (1992). A contrary conclusion was reached by Williams, Waldauer, and Duggal (1992).

Several studies have examined the peer effects of roommates in higher education. In an extensive study at Dartmouth, Sacerdote (2001) concluded that peer effects based on room assignment had a significant impact on GPA. In a later study, Zimmerman (2003) came to a similar result. However, in a study at the University of Maryland, Foster did not find peer effects on the basis of either roommates or friends. Brunello, De Paola, and Scoppa (2010) examined peer effects by subject and found that roommate peer effects were positive and significant for students enrolled in math, engineering and the natural sciences, but close to zero in the humanities and social sciences.

DATA

The study presented here encompasses three semesters at Western Carolina University, spring 2006, fall 2006, and spring 2007. During that period, primary data was collected from two principles of microeconomics classes and five principles of macroeconomics classes. All seven classes were taught by the same professor. The two micro classes and two of the macro classes were honors sections, while three of the macro sections were non-honors. Class size varied from thirteen students in the smallest section of principles to thirty-five students in the largest section. Honors sections were smaller on average than non-honors sections. Honors classes averaged approximately sixteen students per section, while non-honors classes averaged thirty students per section.

The original sample consisted of 153 students who completed the courses they were enrolled in by taking the four tests required in each of these seven classes. There were thirty-three multiple-choice questions in each exam. The tests administered to honors sections and non-honors sections were identical. The individual test was the observational unit. Thus, there were potentially 612 observations. However, nine students had missing data from their records—specifically, high school grade point average and/or verbal and math entrance scores (SAT)—because they were transfer students. Hence, thirty-six observations were lost, leaving a sample of 144 students and 576 observations. The descriptive statistics for the sample are given in Table 1, below.

Table 1: Descriptive Statistics

	Total	Honors	Non-Honors
Number of Students	144	72	72
Female	58	33	25
Male	86	39	47
High School GPA Mean	3.268	3.586	2.950
High School GPA St Dev.	.585	.547	.427
High School GPA Range	1.87 – 4.92	2.31 – 4.92	1.87 – 3.71
Verbal SAT Score Mean	513.125	548.056	478.194
Verbal SAT Score St. Dev.	79.095	78.552	62.566
Verbal SAT Score Range	350 – 670	350 – 670	350 – 620
Math SAT Score Mean	539.375	573.333	505.417
Math SAT Score St. Dev.	79.004	75.445	67.073
Math SAT Score Range	260 – 770	410 – 770	260 – 640

REGRESSION MODEL

The dependent variable in the regression model was percentage of correct answers on each exam. The independent variables were: overall high school GPA; verbal SAT score; math SAT score; a dummy variable for whether or not a student was in the Honors College (one was assigned to Honors College students); a dummy variable for gender (one was assigned for males); a dummy variable to separate the first three tests from the fourth exam because a preliminary examination of the data revealed a seemingly lower test score for the fourth exam when compared to the average score of the first three tests (one was assigned to the fourth exam); class size. Based on the above dependent and independent variables, the following regression model was then estimated:

$$Y = \text{intercept} + \beta 1 \text{ high school GPA} + \beta_2 \text{ verbal SAT score} + \beta_3 \text{ math SAT score}$$

$$+ \beta_4 \text{ honors college student} + \beta_5 \text{ male} + \beta_6 \text{ test 4} + \beta_7 \text{ class size} + e_i$$

The predictive model generated by the regression was:

$$Y_i = 21.616 + 2.969 \text{ high school GPA} + .002 \text{ verbal SAT score} + .057 \text{ math SAT score}$$

$$+ 9.456 \text{ honors college student} - .308 \text{ male} - 3.248 \text{ exam 4} + .091 \text{ class size}$$

The empirical statistics generated by the regression model are given in Table 2, below.

A review of the data indicates that students' high school GPAs were a statistically significant predictor of test scores at the 95% level of confidence. Math SAT scores were a statistically significant predictor at the 99% level of confidence, while verbal SAT scores proved to be an insignificant predictor of test scores. The most plausible explanation for the insignificance of verbal scores is that there are several international students in the sample for whom English is a second language. Their relatively low SAT scores likely reflect their English proficiency rather than their overall language skills. For instance, it is not uncommon for some international students to score 350 in the verbal portion of the SAT and 650 in the mathematical section of the SAT. Enrollment in the Honors College was a significant predictor of student success in principles of economics classes at Western Carolina University. It was statistically significant at the 99% level of confidence. Although females scored slightly higher than their male counterparts on exams, gender was not a statistically significant explanatory variable. Class size positively influenced test scores, but was statistically insignificant—a Pearson correlation coefficient of .91766 revealed the probability of multicollinearity between the independent variables of class size and Honors College student .

Table 2: Regression Results

Statistics for Overall Model					
Multiple R			0.557616		
R-square			0.310936		
Adjusted R-square			0.302444		
Standard Error			12.97999		
Number of Observations			576		
ANOVA	df	SS	MS	f-stat	p-value
Regression	7	43182.52	6168.931	36.61517	2.6564E-42
Residual	568	95696.75	168.4018		
Total	575	138879.3			

Table 2: Regression Results				
Variable	Coefficients	Standard Error	t-stat	p-value
Intercept	21.61615	6.301485	3.430327**	0.000647
High School GPA	2.968906	1.20959	2.454473*	0.014408
Verbal SAT Score	0.001916	0.008993	0.213075	.831345
Math SAT Score	0.056991	0.009171	6.214342**	98E-10
Honors College Student	9.456155	1.821381	5.19175**	.91E-07
Male	-0.30783	1.176023	-0.26176	0.793604
Test4	-3.24785	1.249	0.009555**	0.009555
Class Size	0.091179	0.106325	0.391503	0.391503
*significant at .05 **significant at .01				

As noted above, students scored significantly lower on the fourth exam than the previous three exams. The explanation for this is not level of difficulty because the test is not comprehensive, and to the extent possible, is calibrated at the same level of difficulty as the prior three tests. There are two plausible explanations for this outcome. First, some students may feel that their grade is "locked in" and, therefore, there is no payoff for extra effort—indicative perhaps of their understanding of the fundamental economic concept of opportunity cost. Second, some students may be fatigued at the end of the semester, and are consequently not willing or able to muster that last push.

The adjusted R^2 statistic indicates that about thirty per cent of the variation in exam scores is explained by the regression model. The robust F-statistic is significant, indicating that the overall model is a good predictor of student performance in principles of economics courses.

MEANS TESTS FOR PEER EFFECTS

Because of the statistically significant difference between student performance on the first three exams and student performance on the final exam, two separate t-tests of means were performed to analyze whether or not peer effects based on section type—honors versus non-honors—affected Honors College students' performance. The first test of means was on exams one through three, and the second test was on the fourth exam only. Both tests of means assumed equal variances in the samples because they were drawn from the same population of students. A one-tailed test was performed because peer effects, if any existed, were hypothesized to be positive.

In the first test, sample one consisted of Honors College students who were enrolled in strictly honors sections of principles—there were sixty-one students, each taking three tests, for a total of 183 observations. Sample two consisted of Honors College students enrolled in regular

sections of principles—that sample consisted of eleven students each taking three exams, for a total of thirty-three observations. The empirical results are given in Table 3, below.

The means test employed for the first three exams revealed statistically significant positive peer effects at the ninety-five percent level of confidence. This test of means strongly indicated that Honors College student performance was positively enhanced by being enrolled in strictly honors sections of principles courses in economics. This empirical finding is evidence that positive peer effects exist at the individual class level for Honors College students at Western Carolina University.

Table 3: Two-Sample t-test for Exams 1-3		
	Honors Students in Honors Classes	Honors Students in Non-honors Classes
Mean	78.028514	73.7397
Variance	128.259144	135.8204
Observations	183	33
Pooled Variance	129.389797	
df	214	
t-stat	1.99350141	
p-value	0.02373821	
t-critical	1.65200516	

The second means test was then performed on the same two samples of students, but this time on only their last exam only. Sample one consisted of sixty-one observations, while sample two consisted of eleven observations. The results are given below in Table 4, below.

Table 4: Two-Sample t-test for Exam 4		
	Honors Students in Honors Classes	Honors Students in Non-honors Classes
Mean	181.7452459	75.48363636
Variance	45486.54002	261.6261855
Observations	61	11
Pooled Variance	29025.83805	
Df	70	
t-stat	1.642083672	
p-value	0.052529038	
t-critical	1.66691448	

In the means test on the last exam only, Honors College student achievement in principles of economics courses was positively affected by being enrolled in strictly honors sections. However, though not statistically significant at the ninety-five percent level of

confidence, the p-value of 0.0525 closely approaches significance. The empirical results from the two tests of means indicate that honors students are more likely to achieve an optimum outcome if they are enrolled in an honors section.

CONCLUSION

In this study, a statistically significant regression model was developed to predict student success in principles of economics courses. The independent variables chosen for the model that were found to be statistically significant indicators of student outcomes were: 1) high school GPA, 2) math SAT score, 3) enrollment in the Honors College. The model did not find the independent variable of gender to be a statistically significant predictor of student success.

In addition, the study utilized two tests of means to analyze whether there were any positive peer effects for Honors College students enrolled in honors college courses. The first t-test revealed statistically significant positive peer effects for those Honors College students enrolled in honors only sections. The second t-test showed positive peer effects associated with enrollment in honors only courses, but the results were statistically insignificant. One of the ways in which the Honors College at Western Carolina University attempts to create the most conducive environment for student achievement is through offering honors only sections. The two tests of means undertaken in this study reveal that there are positive peer effects in these sections, and thus, the honors only sections do indeed enhance student performance.

Approximately sixty percent of currently enrolled Honors College students at Western Carolina University are housed in the honors dorms (Balsam and Blue Ridge). An interesting future study would be to analyze whether there are positive peer effects associated with being housed in an Honors College dorm, rather than other student housing. Another potential contribution to the study of peer effects in higher education would be to explore whether peer effects exist on the roommate level among both honors college students and non-honors college students.

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THE INFLUENCE OF GENDER AND RACE ON THE SOCIAL SECURITY EARLY RETIREMENT DECISION FOR SINGLE INDIVIDUALS

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ABSTRACT

There has been an extensive amount of research into the social security early and delayed retirement decision for single individuals. The results have been mixed. This paper extends the analysis of prior research to the early and delayed retirement decision for single men and women. We analyze the decision for single individuals by gender and by race. Our results show two optimal ages for retirement for both men and women: age 64 and age 67. Various factors play into the retirement decision, but if early retirement is desired, one should wait until age 64. If an individual does not retire at age 64, then they should retire no later than age 67.

INTRODUCTION

The United States Census Bureau considers a baby boomer to be an individual born between 1946 and 1964 (http://www.census.gov/population/www/socdemo/age/general-age.html#bb). Those born in 1946 will reach full retirement age (FRA) in 2012, while those born in 1964 must wait until 2031 to retire with full social security benefits. Boomers have the option to retire earlier or later than their FRA. Early retirement is attractive for many reasons: social security benefits (SSB) and rules can change, health concerns, and increased demand for leisure, to name a few. However, SSB are permanently reduced by an actuarial reduction factor ($5/9^{ths}$ of 1% for the first 36 months and $5/12^{ths}$ of 1% per month thereafter for early retirement). Delayed retirement is attractive because SSB are increased by a delayed retirement credit (DRC) of 8% for each year of delay after FRA up to age 70.

There has been an extensive amount of research into the social security early and delayed retirement decision for single individuals. The results have been mixed. This paper will extend the analysis of prior research to the early and delayed retirement decision for the baby boom generation now at or rapidly approaching retirement. We will analyze the decision for single individuals by gender and by race. We will create a spreadsheet to model this and other early retirement scenarios that will be beneficial for individual investors and their advisors.

LITERATURE REVIEW

Many prior studies have looked at the optimal age for a person to retire[See Rose and Larimore(2001), Cook, Jennings and Reichenstein (2002), Muksian (2004), Kinderman and Jennings (2006), Spitzer (2006), Munnell and Soto (2007), Cunningham and Erickson (2009), Tucker (2009), Sun and Web (2009) and Ryan (2010)]. Depending upon the methodology chosen, the assumptions made, and the life expectancies tables used, the optimum retirement age for men and women has ranged from 62 to 70. These studies find the retirement age that maximizes the PV of future SSB over some life expectancy.

The simplest studies assume one discount rate (DR), no taxes, no cost of living adjustments (COLA), no dependents, no other earnings such that SSB are not subject to the Earnings Test (ET), and no other income such that no SSB are taxed. Among these studies, Rose and Larimore (2001) find 62 to be the optimal retirement age for both men and women; while Munnell and Soto (2007) find the optimal age to be 62 for men and 68 for women. Kinderman and Jennings (2006) find that the desired retirement age increases as cost of living adjustments increase and discount rates decrease. Sun and Webb (2009) find the preferred retirement age to be 62 or 69 for men and 67 or 70 for women depending on their risk aversion. As complexities are added to these PV analysis studies, such as different discount rates, tax considerations, COLA assumptions, and taxability of SSB, other retirement ages become optimal.

Another group of studies looks at finding an internal rate of return (IRR) between various retirement ages [See McCormack and Perdue (2006) and Friedman and Phillips (2008)].

Both of these are simple studies assuming no taxes, no cost of living adjustments, no dependents, no other earnings such that SSB are not subject to the Earnings Test, and no other income such that no SSB are taxed. The advantage of the IRR studies over the PV studies is that the optimum retirement age is not subject to the whims of the discount rate choice.

McCormack and Perdue (2006) find the optimal retirement age to be 66 for both white males and females. In their IRR calculation, they assume SSB are received monthly and the retirement decision is made annually. However, a shortcoming of their study is that they assume the median life expectancies at age 62 (as provided by the U.S. Life Tables) remain constant; when, in fact, the U.S. Life Tables show that life expectancy changes as one ages (See Table 1). In their study, a white male, retiring at age 62, has a median life expectancy of 19 years (age 81). If the man decides to retire at age 65, they adjust the life expectancy to 16 years (age 81). But, according to the life expectancy tables (See Table 1), a white male, age 65, has a life expectancy of 17 years (age 82). A more accurate IRR would have been attained had they applied the revised life expectancy.

Friedman and Phillips (2008) find the optimal age for both males and females to be 63. Their IRR calculations are less exact in that they assume SSB are received in an annual lump sum, when in fact they are received monthly. They, like McCormack and Perdue (2006), do not correct for the change in life expectancies at subsequent retirement ages.

HOW SOCIAL SECURITY WORKS

3.1. Who is eligible for benefits?

The Social Security system pays benefits to retirees, spouses, children, survivors, the disabled, and the aged. Individuals aged 62 or older who had earned income that was subject to the Social Security payroll tax for at least 10 years (40 quarters) since 1951 are eligible for retirement benefits. This study will focus on single individuals with their own earnings and ignore married couples, divorced spouses, surviving spouses, single individuals with dependents, and disabled workers.

3.2. Early Retirement Age (ERA) versus Full Retirement Age (FRA) versus Delayed Retirement

Early Retirement Claiming

No matter what your FRA is, you may start receiving benefits as early as age 62. However, if you start your benefits early, they will be reduced a fraction of a percent for each month before your FRA. This reduction is permanent. Workers claiming before FRA have their SSB reduced by a factor of 5/9 of 1% per month for the first 36 months prior to FRA and 5/12 of 1% per month for every month thereafter. Thus, a worker with a FRA of 66 who claims early at age 62 receives 75% of their FRA benefit amount; a worker with a FRA of 67 who claims at age 62 receives only 70% of their FRA benefit amount.

3.2.2. Delayed Retirement Claiming

A worker may choose to defer receipt of SSB past his FRA. In this case a delayed retirement credit (DRC) will be added to the FRA benefit. For each month in which the worker is at least FRA, but not yet age 70, his SSB will increase. For workers reaching FRA in 2009 or later, their monthly percentage increase will be 2/3 of 1% or a yearly percentage increase of 8%. Thus, a worker with a FRA of 66 who delays claiming until age 70 receives 132% of their FRA benefit amount; a worker with a FRA of 67 who claims at age 70 receives only 124% of their FRA benefit amount.

Earnings Test Adjustments to SSB

Workers who claim early retirement benefits, but continue to work, may have their SSB reduced. This is referred to as the Earnings Test (ET). The Social Security Administration

(SSA) withholds $1 in benefits for every $2 of earnings in excess of the lower exempt amount. In the year a worker reaches FRA, monthly benefits are reduced $1 for every $3 of earnings in excess of the higher exempt amount. Earnings in or after the month you reach FRA do not count toward the earnings test. The low and high exemption amounts for 2011 are $14,160 and $37,680 (www.socialsecurity.gov/pubs/10003.html). Since 2000, there has been no ET above the FRA (www.socialsecurity.gov/pubs/10003.html).

For example, assume Michael, a black male, whose FRA is 66 decides to retire at age 62 and to continue working at his $24,000 per year salary. Assuming his SSB at FRA are $1,600 per month ($19,200 annual), his early retirement benefit will be 75% of $1,600 or $1,200 per month ($14,400 annual). Since Michael's earnings of $24,000 will be $9,840 over the lower exemption amount of $14,160, his SSB will be further reduced by $1 for every $2 in his excess earnings of $9,840. This amounts to another reduction of $4,920. His annual SSB are now $9,480 ($14,400 - $4,920). The SSA does not adjust each monthly SSB check by a proportional amount (http://articles.moneycentral.msn.com/RetirementandWills/RetireEarly/the-social-security-catch-22.aspx). Instead, Michael will receive no SSB for months one through four, $1,080 in month five, and then $1,200 per month for months six through twelve, for an annual amount of $9,840. (Annual reduction amount of $4,920/$1,200 = 4.1 months. Months 1 – 4 recovers 4 x $1,200 = $4,800 of the reduction amount. $4,920 - $4,800 = $120 is subtracted from the $1,200 month five benefit to yield a $1,080 SSB payment. The remaining seven months Michael receives his $1,200 per month benefit.).

The question for Michael is: Do I retire early at reduced benefits and continue working, or do I wait until FRA to retire? Michael's before tax earnings and SSB total $24,000 + $9,480 = $33,480. Had Michael's salary been less than the lower exemption amount, his before tax earnings and SSB would have been $14,160 + $14,400 = $28,560. If Michael waits until FRA his before tax earnings and SSB total $24,000 + $19,200 = $43,200. Of course, the decision to retire early or wait is more complicated than the simple scenario presented above and will be the subject of future research.

MODEL

Similar to McCormack and Perdue (2006), we avoid the problem of an uncertain discount rate by computing the internal rate of return (IRR) equating two retirement options. The IRR can be solved for by using the following equation:

$$\%Benefit\_1 \times \sum_{1}^{i} \left(\frac{1}{1+\frac{IRR}{12}} \right)^{i} = \%Benefit\_2 \times \sum_{1}^{j} \left(\frac{1}{1+\frac{IRR}{12}} \right)^{j} \times \left(\frac{1}{1+\frac{IRR}{12}} \right)^{N2-N1}$$

where:

%Benefit_x = percent of SSB received based on retirement age
i = 1 to months to life expectancy for Age 1
j = 1 to months to life expectancy for Age 2
N2 – N1 = difference in months between Age 1 and Age 2, where Age 2 is greater than Age 1.

The left-hand side of the equation, $\%Benefit\_1 \times \sum_1^i \left(\frac{1}{1+\frac{IRR}{12}}\right)^1$, represents the present value of initiating receipt of benefits at age 1. The first term on the right-hand side of the equation, $\%Benefit\_2 \times \sum_1^j \left(\frac{1}{1+\frac{IRR}{12}}\right)^j$, represents the present value of initiating receipt of benefits at age 2; the second term on the right-hand side, $\left(\frac{1}{1+\frac{IRR}{12}}\right)^{N2-N1}$, discounts the present value of benefits at age 2 back to age 1 so that comparisons can be done at the same point in time.

4.1. Assumptions in the Model

4.1.1. Retirement decision

We assume benefits are received monthly. The retirement decision is made annually because life expectancy tables only provide annual data. As suggested by Friedman and Phillips (2008), in the retirement decision, an individual is faced with a trade-off: to retire now or to delay retirement for 1 more year. For each year one delays retirement, SSB will permanently increase; however, for each year one delays, the time that one will draw benefits shortens.

4.1.2. Life expectancies

The 2006 United States Life Tables and the 2010 National Center for Health Statistics provide life expectancies. National Vital Statistics Report, June 28, 2010, Volume 58, Number 21; United States Life Tables, 2006 provides life expectancies for black and white males and females. Arias E., United States life tables by Hispanic origin. National Center for Health Statistics. Vital Health Stat 2(152). 2010 provides life expectancies for Hispanic males and females.

Table 1: Average life expectancy given current age

	All Males		White Males		Black Males		Hispanic Males	
Age	Avg # years remaining	Expected age to die	Avg # years remaining	Expected age to die	Avg # years remaining	Expected age to die	Avg # years remaining	Expected age to die
62	19.2	81.2	19.3	81.3	16.9	78.9	21.3	83.3
63	18.5	81.5	18.6	81.6	16.3	79.3	20.5	83.5
64	17.7	81.7	17.8	81.8	15.7	79.7	19.7	83.7
65	17.0	82.0	17.1	82.1	15.1	80.1	19.0	84.0
66	16.3	82.3	16.4	82.4	14.5	80.5	18.2	84.2
67	15.6	82.6	15.7	82.7	13.9	80.9	17.5	84.5
68	14.9	82.9	15.0	83.0	13.4	81.4	16.8	84.8
69	14.2	83.2	14.3	83.3	12.8	81.8	16.1	85.1
70	13.6	83.6	13.6	83.6	12.3	82.3	15.4	85.4
	All Females		White Females		Black Females		Hispanic Females	
Age	Avg # years remaining	Expected age to die	Avg # years remaining	Expected age to die	Avg # years remaining	Expected age to die	Avg # years remaining	Expected age to die
62	22.1	84.1	22.2	84.2	20.7	82.7	24.2	86.2
63	21.3	84.3	21.4	84.4	20.0	83.0	23.4	86.4
64	20.5	84.5	20.6	84.6	19.3	83.3	22.6	86.6
65	19.7	84.7	19.8	84.8	18.6	83.6	21.7	86.7
66	18.9	84.9	19.0	85.0	17.9	83.9	20.9	86.9
67	18.2	85.2	18.2	85.2	17.2	84.2	20.1	87.1
68	17.4	85.4	17.4	85.4	16.5	84.5	19.3	87.3
69	16.6	85.6	16.6	85.6	15.8	84.8	18.5	87.5
70	15.9	85.9	15.9	85.9	15.1	85.1	17.7	87.7

Source: National Vital Statistics Report, June 28, 2010, Volume 58, Number 21; United States Life Tables, 2006; and Arias E. United States life tables by Hispanic origin. National Center for Health Statistics. Vital Health Stat 2(152). 2010.

Life expectancy is adjusted for when a worker retires. For example, a white male who retires at age 62 is expected to live approximately 19 more years to age 81; whereas if he waits and retires at age 66 he is expected to live approximately 16 more years to age 82. This is a correction to previous studies which would have said that if he retired at age 66 he only lived 15 more years to age 81. We look at life expectancies based on gender and race.

4.1.3. Earnings Test

As previously mentioned, the SSA may reduce SSB if a worker retires early, but continues to work. For simplicity, we assume excess earnings are $0 and that early retirement SSB are not further reduced.

4.1.4. Taxation of SSB

If a retiree has substantial income (earned and unearned) in addition to his SSB, up to 85% of his annual benefits may be subject to Federal income tax. The amount of SSB subject to Federal income tax is the smaller of 1) one-half of annual SSB, or 2) one-half of the amounts by which Adjusted Gross Income (AGI) plus tax-exempt interest plus one-half of SSB exceeds

$25,000 for singles, or 3) one-half of SSB plus all other income exceeds $34,000 for singles (www.irs.gov/publications/p915/ar02.html). In our analysis we assume other income is below the minimum such that 0% of SSB are taxed. However, by using the IRR method to find the optimal retirement age, taxation of SSB really becomes irrelevant, since (1-tax rate of SSB) shows up on both the left- and right-hand sides of our equation, effectively cancelling out one another.

4.1.5. COLA

Since 1983, the SSA provides for an automatic increase in SSB if there is an increase in the CPI-W from third quarter last year to third quarter of the current year. For 2009 and 2010 this change in CPI-W has been negative and SSB have not been increased. Spitzer (2006) finds that only longevity and expected rates of return are determining factors as the optimal time to retire and that inflation and taxes play no significant role. As a consequence we assume COLA is zero.

4.1.6. Other Assumptions

We also assume the retiree has no dependents. If a retiree also receives a government pension, their SSB may be reduced due to the Government Pension Offset provision; consequently, we assume no government pension is received. Furthermore, an individual may be forced into a higher federal or state tax bracket due to other income; this, too, is irrelevant in our analysis and is ignored.

AN EXAMPLE

Let us look again at Michael, a black male born in 1948, who is trying to decide if he should retire early at age 62 or wait until his FRA of 66. According to Table 1, his life expectancy at age 62 is an additional 16.9 years (202.8 months) to age 78.9; while his life expectancy at age 66 is an additional 14.5 years (174 months) to age 80.5. Based on current Social Security requirements, he will receive 100% of his SSB at age 66, but only 75% of his FRA benefits at age 62.

$$0.75\times\sum_{t=1}^{202.8}\left(\frac{1}{1+\frac{IRR}{12}}\right)^{t}-1.00\times\sum_{t=1}^{174}\left(\frac{1}{1+\frac{IRR}{12}}\right)^{t}\times\left(\frac{1}{1+\frac{IRR}{12}}\right)^{(66\,62)\times 12}$$

Using Excel and Solver we can find the IRR that will equate both sides of the equation to equal 4.60%. If Michael's opportunity costs are less (greater) than 4.60%, then he should retire at the later (earlier) age.

Assume Michael's SSB at FRA of 66 is $1,600 per month and his early retirement benefit is 75% or $1,200 per month at age 62. If the current market interest rate is 5%, then present value (PV) of the left-hand side of the equation (retire early at age 62) is $164,070 and the PV of the right-hand side of the equation (delay retirement to age 66) is $161,962; a difference of $2,108. If Michael believes he could invest his monthly SSB at 4.6% or greater over the next four years, then he should retire early, at age 62; if not he should delay retirement until age 66. Of course, this assumes Michael does not need any of his SSB on which to live – a highly unlikely assumption.

RESULTS

6.1. 1943-1954 Birth Year Cohort Group

6.1.1. By Gender

Table 2 reports IRRs by gender. The breakeven IRRs reported in Table 2 may be variously interpreted as the minimum investment yield (or hurdle rate) required to justify retirement at Age 1 versus Age 2.

Table 2: Breakeven IRR and Changes in IRR between Alternative Retirement Ages, 1943-1954 Birth Year Cohort, by Gender

Panel A1: All Single Males - Breakeven IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	3.75%	4.77%	4.73%	**4.51%**	4.56%	4.44%	4.23%	**3.97%**
63		**5.76%**	5.21%	4.76%	4.76%	4.57%	4.31%	4.00%
64			4.64%	4.25%	4.42%	4.27%	4.02%	3.70%
65				3.85%	4.31%	4.15%	3.86%	3.51%
66					**4.77%**	4.29%	3.86%	**3.43%**
67						3.81%	3.40%	2.97%
68							3.00%	2.55%
69								2.09%
70								

Panel A2: All Single Males - Marginal Change in IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	-	**1.02%**	-0.04%	-0.22%	**0.05%**	-0.13%	-0.20%	-0.26%
63		**2.01%**	-0.55%	-0.45%	**0.00%**	-0.19%	-0.26%	-0.31%
64			-1.12%	-0.39%	**0.17%**	-0.15%	-0.25%	-0.32%
65				-0.79%	**0.46%**	-0.17%	-0.29%	-0.35%
66					**0.92%**	-0.48%	-0.43%	-0.44%
67						-0.96%	-0.40%	-0.43%
68							-0.81%	-0.45%
69								-0.91%
70								

Table 2: Breakeven IRR and Changes in IRR between Alternative Retirement Ages, 1943-1954 Birth Year Cohort, by Gender (continued)

Panel B1: All Single Females - Breakeven IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	4.17%	5.19%	5.15%	**4.95%**	5.00%	4.89%	4.68%	**4.42%**
63		**6.19%**	5.63%	5.21%	5.21%	5.03%	4.76%	4.46%
64			5.05%	4.71%	4.88%	4.74%	4.47%	4.16%
65				4.37%	4.79%	4.63%	4.32%	3.98%
66					**5.21%**	4.76%	4.30%	**3.88%**
67						4.31%	3.84%	3.43%
68							3.36%	2.98%
69								2.60%
70								

Panel B2: All Single Females - Marginal Change in IRR

Age 1 \ Age 2	63	64	65	66	67	68	69	70
62	-	**1.03%**	-0.05%	-0.19%	**0.05%**	-0.12%	-0.21%	-0.25%
63		**2.02%**	-0.56%	-0.41%	**0.00%**	-0.18%	-0.27%	-0.30%
64			-1.13%	-0.34%	**0.17%**	-0.14%	-0.27%	-0.31%
65				-0.68%	**0.42%**	-0.16%	-0.31%	-0.34%
66					**0.83%**	-0.45%	-0.46%	-0.42%
67						-0.90%	-0.47%	-0.41%
68							-0.94%	-0.38%
69								-0.76%
70								

Notes: Breakeven IRR between consecutive ages denoted in red

FRA age is 66.

Table 2, Panel A1 shows the breakeven IRR for single men. For example, Ralph, a single male born in 1948, turns 62 in 2010 and 66 in 2014. Ralph is faced with the decision to retire today, at age 62 or wait another year and retire at age 63. According to Table 2, Panel A1, Ralph's breakeven IRR between ages 62 and 63 is 3.75%. In deciding whether to retire early or wait another year, Ralph needs to consider current market rates. If Ralph could invest his monthly SSB at a rate greater than the 3.75% hurdle rate, then he should retire at age 62, if not, then he should delay retirement to age 63. In 2010 the 1-year U.S. Treasury Bond rate was 0.32% (http://www.federalreserve.gov/releases/h15/data.htm). This rate is less than Ralph's 3.75% breakeven IRR and thus dictates that Ralph should postpone retirement one more year, to age 63. Next year in 2011, Ralph will be faced with the same decision, retire at age 63 or postpone retirement to age 64. The breakeven IRR between age 63 and age 64 is 5.76%. Ralph will then need to compare this rate to current market rates to make an informed retirement decision.

Results for women are similar. Table 2, Panel B1 shows the breakeven IRR for a single female. The major difference between the sexes is that in all cases the breakeven IRR is higher for women than it is for men. The higher hurdle rates for women are due to their longer life expectancies. For example, Mary's breakeven IRR between retirement ages of 62 and 63 is

4.17%, or 0.42% higher than Ralph's 3.75% breakeven IRR. Market rates hereby must be higher in order to entice women to entertain the idea of early retirement. For example, if a 1-year investment yields 4.00% in 2010, then Ralph would retire at age 62 (4.00% > 3.75%), while Mary would postpone retirement for another year (4.00% < 4.17%).

The breakeven IRR between consecutive ages are highlighted in red in Table 2, Panels A1 and B1. Note that the IRR oscillate back and forth from age to age sometimes increasing, other times decreasing. This oscillation between consecutive years is supported by Friedman and Phillips (2008). Although the magnitude of the breakeven IRR differs between the two studies, the change in IRR between consecutive years is in the same direction. Thus, we support Friedman and Phillips conclusion that the minimum investment yield required to justify initiation at any eligible age varies from one age to the next within a cohort group, and while it may be advantageous to initiate benefits at a particular age, early retirement might not be advantageous a year later.

Table 2, Panels A2 and B2 show the marginal change in breakeven IRR between different retirement ages. The optimal time to retire would then be at the point when the marginal change turns from positive to negative. This occurs at two points for both men and women: age 64 and age 67. The highest IRR is at age 64, the second highest at age 67. The choice to delay retirement past age 67 is suboptimal since the marginal change in IRR decreases.

Kinderman and Jennings (2006), who do not consider the DRC, found that the desired retirement age decreases as discount rates increase. We concur. As one's opportunity costs (discount rate) increases, earlier retirement is preferred over later retirement up to age 67.
Spitzer (2006), who does consider the DRC found that if one's opportunity costs (discount rate) are less than 4%, delayed retirement is preferred. As discount rates increase above 4%, early retirement is preferred. Again, our results support this conclusion.

6.1.2. By gender and race.

Table 3 reports IRRs by gender and race. Irrespective of race or gender, ages 64 and 67 are the optimum retirement ages. Table 3, Panels A1, A2, and A3 show that white males have a lower IRR than black males who have a lower IRR than Hispanic males. Likewise, Table 3, Panels B1, B2, and B3 show that white females have a lower IRR than black females who have a lower IRR than Hispanic females. Hispanic men and women have the highest life expectancies so it seems logical that their breakeven IRR is the highest. Black men and women have the lowest life expectancies so they should have the lowest breakeven IRR; however, this is not the case. Breakeven IRR for black men and women are greater than those for white men and women. This seems counterintuitive because life expectancies for whites are greater than it is for blacks.

Table 3: Breakeven IRR and Changes in IRR between Alternative Retirement Ages, 1943-1954 Birth Year Cohort, by Gender and Race

Panel A1: Single White Males - Breakeven IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	3.74%	4.76%	4.71%	**4.51%**	4.56%	4.43%	4.21%	**3.94%**
63		**5.75%**	5.19%	4.76%	4.76%	4.56%	4.29%	3.97%
64			4.63%	4.26%	4.42%	4.26%	3.99%	3.66%
65				3.89%	4.32%	4.14%	3.82%	3.47%
66					**4.74%**	4.26%	3.80%	**3.37%**
67						3.77%	3.33%	2.90%
68							2.88%	2.46%
69								2.03%
70								

Panel A1.1: Single White Males - Marginal Change in IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	-	**1.02%**	-0.04%	-0.21%	**0.05%**	-0.13%	-0.22%	-0.27%
63		**2.01%**	-0.56%	-0.43%	**0.00%**	-0.19%	-0.28%	-0.32%
64			-1.12%	-0.37%	**0.16%**	-0.16%	-0.27%	-0.32%
65				-0.74%	**0.43%**	-0.18%	-0.31%	-0.35%
66					**0.86%**	-0.48%	-0.46%	-0.44%
67						-0.97%	-0.45%	-0.43%
68							-0.90%	-0.42%
69								-0.84%
70								

Panel A2: Single Black Males - Breakeven IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	3.83%	4.81%	4.79%	**4.60%**	4.65%	4.55%	4.36%	**4.13%**
63		**5.77%**	5.26%	4.85%	4.86%	4.69%	4.45%	4.17%
64			4.74%	4.38%	4.55%	4.42%	4.18%	3.90%
65				4.02%	4.45%	4.31%	4.04%	3.73%
66					**4.88%**	4.45%	4.04%	**3.66%**
67						4.01%	3.62%	3.26%
68							3.23%	2.88%
69								2.52%
70								

Panel A2.1: Single Black Males - Marginal Change in IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	-	**0.98%**	-0.02%	-0.19%	**0.06%**	-0.11%	-0.19%	-0.23%
63		**1.94%**	-0.51%	-0.41%	**0.01%**	-0.17%	-0.24%	-0.27%
64			-1.03%	-0.36%	**0.16%**	-0.13%	-0.24%	-0.28%
65				-0.72%	**0.43%**	-0.15%	-0.27%	-0.30%
66					**0.85%**	-0.43%	-0.40%	-0.38%
67						-0.86%	-0.39%	-0.37%
68							-0.78%	-0.36%
69								-0.71%
70								

Panel A3: Single Hispanic Males - Breakeven IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	4.09%	5.11%	5.09%	**4.90%**	4.97%	4.87%	4.68%	**4.44%**
63		**6.10%**	5.58%	5.16%	5.18%	5.02%	4.77%	4.49%
64			5.06%	4.68%	4.87%	4.74%	4.50%	4.21%
65				4.31%	4.77%	4.64%	4.36%	4.04%
66					**5.23%**	4.80%	4.38%	**3.97%**
67						4.36%	3.95%	3.55%
68							3.52%	3.14%
69								2.74%
70								

Panel A3.1: Single Hispanic Males - Marginal Change in IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	-	**1.02%**	-0.02%	-0.19%	**0.07%**	-0.10%	-0.19%	-0.24%
63		**2.01%**	-0.52%	-0.42%	**0.02%**	-0.16%	-0.25%	-0.29%
64			-1.05%	-0.37%	**0.18%**	-0.13%	-0.24%	-0.29%
65				-0.75%	**0.47%**	-0.14%	-0.28%	-0.32%
66					**0.92%**	-0.43%	-0.42%	-0.40%
67						-0.87%	-0.42%	-0.40%
68							-0.84%	-0.39%
69								-0.78%
70								

Notes: Breakeven IRR between consecutive ages denoted in red

FRA age is 66.

Table 3: Breakeven IRR and Changes in IRR between Alternative Retirement Ages, 1943-1954 Birth Year Cohort, by Gender and Race (continued)

Panel B1: Single White Females - Breakeven IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	4.18%	5.18%	5.14%	**4.94%**	4.99%	4.87%	4.65%	**4.39%**
63		**6.16%**	5.62%	5.20%	5.19%	5.01%	4.73%	4.42%
64			5.06%	4.70%	4.86%	4.71%	4.43%	4.12%
65				4.34%	4.76%	4.59%	4.27%	3.93%
66					**5.17%**	4.72%	4.25%	**3.83%**
67						4.26%	3.78%	3.37%
68							3.30%	2.91%
69								2.52%
70								

Panel B1.1: Single White Females - Marginal Change in IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	-	**1.01%**	-0.04%	-0.20%	**0.05%**	-0.12%	-0.22%	-0.26%
63		**1.99%**	-0.55%	-0.42%	-0.01%	-0.18%	-0.28%	-0.31%
64			-1.10%	-0.36%	**0.16%**	-0.15%	-0.28%	-0.31%
65				-0.73%	**0.42%**	-0.17%	-0.32%	-0.34%
66					**0.83%**	-0.45%	-0.46%	-0.43%
67						-0.91%	-0.47%	-0.42%
68							-0.96%	-0.39%
69								-0.78%
70								

Panel B2: Single Black Females - Breakeven IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	4.19%	5.19%	5.18%	**5.00%**	5.05%	4.94%	4.75%	**4.52%**
63		**6.17%**	5.67%	5.27%	5.27%	5.09%	4.84%	4.56%
64			5.16%	4.81%	4.96%	4.82%	4.57%	4.29%
65				4.45%	4.86%	4.70%	4.42%	4.11%
66					**5.27%**	4.83%	4.41%	**4.02%**
67						4.38%	3.97%	3.60%
68							3.55%	3.21%
69								2.86%
70								

Panel B2.1: Single Black Females - Marginal Change in IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	-	**1.01%**	-0.01%	-0.18%	**0.05%**	-0.11%	-0.20%	-0.23%
63		**1.98%**	-0.50%	-0.40%	**0.00%**	-0.18%	-0.25%	-0.28%
64			-1.01%	-0.35%	**0.16%**	-0.15%	-0.25%	-0.28%
65				-0.71%	**0.41%**	-0.16%	-0.28%	-0.31%
66					**0.83%**	-0.45%	-0.42%	-0.38%
67						-0.90%	-0.41%	-0.37%
68							-0.82%	-0.34%
69								-0.69%
70								

Panel B3: Single Hispanic Females - Breakeven IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	4.45%	5.48%	5.45%	**5.27%**	5.34%	5.23%	5.04%	**4.80%**
63		**6.47%**	5.94%	5.53%	5.56%	5.39%	5.13%	4.85%
64			5.40%	5.06%	5.25%	5.11%	4.86%	4.57%
65				4.71%	5.17%	5.01%	4.72%	4.40%
66					**5.63%**	5.16%	4.72%	**4.32%**
67						4.68%	4.25%	3.87%
68							3.82%	3.45%
69								3.08%
70								

Panel B3.1: Single Hispanic Females - Marginal Change in IRR

Retirement Age 1 \ Retirement Age 2	63	64	65	66	67	68	69	70
62	-	**1.02%**	-0.03%	-0.18%	**0.07%**	-0.11%	-0.20%	-0.24%
63		**2.01%**	-0.53%	-0.40%	**0.02%**	-0.17%	-0.25%	-0.28%
64			-1.07%	-0.35%	**0.19%**	-0.14%	-0.25%	-0.29%
65				-0.70%	**0.47%**	-0.16%	-0.29%	-0.32%
66					**0.93%**	-0.47%	-0.44%	-0.40%
67						-0.95%	-0.42%	-0.39%
68							-0.85%	-0.37%
69								-0.74%
70								

Notes: Breakeven IRR between consecutive ages denoted in red

FRA age is 66.

If the decision to retire is simply between age 62 and FRA, or FRA and age 70, then we concur with McCormack and Perdue (2006) that it is better to delay retirement until FRA, but not beyond. Where we differ is the IRR hurdle rate. A comparison of our results with McCormack and Perdue appears in Table 4.

Table 4: Breakeven IRR between Alternative Retirement Ages, 1943-1954 Birth Year Cohort, White Men and Women

Panel A: Single White Males - Breakeven IRR

Retirement Ages	Breakeven IRR	
	Our Results	McCormack & Perdue*
62 vs 66	4.51%	2.4%
62 vs 70	3.94%	0.5%
66 vs 70	3.37%	0.0%

Panel B: Single White Females - Breakeven IRR

Retirement Ages	Breakeven IRR	
	Our Results	McCormack & Perdue*
62 vs 66	4.94%	3.9%
62 vs 70	4.39%	2.6%
66 vs 70	3.83%	1.3%

*See Table 4, p343 in McCormack and Perdue, 2006.

The difference in our hurdle rates with those of McCormack and Perdue (2006) result from their use of a constant median life expectancy at age 62, where as we adjust the life expectancies to the revised life expectancy at a later retirement age.

6.2. Other Birth Year Cohort Groups

6.2.1. By Gender.

We go a step further than other studies and compare different birth-year cohort groups. For simplicity, we present only the breakeven IRR between the earliest retirement date (age 62) and FRA, between FRA and the latest retirement date (age 70), and between age 62 and 70.

Table 5 shows breakeven IRR for all men and all women. For all birth-year cohort groups, the highest IRR is at FRA. Women again have higher hurdle rates than men.

Table 5: Internal Rates of Return of Alternative Retirement Ages, by Birth Year and Gender									
Panel A: All Single Males born in			**1943 - 1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
	Retirement Age1	**Retirement Age2**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**
Early vs. Full	62	66	**4.51%**						
	62	66 yrs. 2 mo.		**4.62%**					
	62	66 yrs. 4 mo.			**4.75%**				
	62	66 yrs. 6 mo.				**4.84%**			
	62	66 yrs. 8 mo.					**4.93%**		
	62	66 yrs. 10 mo.						**5.05%**	
	62	67							**4.34%**
Early vs. Delayed	62	70	3.97%	3.98%	4.01%	4.02%	4.04%	4.07%	4.08%
Full vs. Delayed	66	70	3.43%						
	66 yrs. 2 mo.	70		3.91%					
	66 yrs. 4 mo.	70			3.84%				
	66 yrs. 6 mo.	70				2.84%			
	66 yrs. 8 mo.	70					2.57%		
	66 yrs. 10 mo.	70						3.59%	
	67	70							3.65%
Panel B: All Single Females born in			**1943 - 1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
	Retirement Age1	**Retirement Age2**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**
Early vs. Full	62	66	**4.95%**						
	62	66 yrs. 2 mo.		**5.03%**					
	62	66 yrs. 4 mo.			**5.15%**				
	62	66 yrs. 6 mo.				**5.22%**			
	62	66 yrs. 8 mo.					**5.29%**		
	62	66 yrs. 10 mo.						**5.39%**	
	62	67							**4.79%**
Early vs. Delayed	62	70	4.42%	4.43%	4.47%	4.48%	4.49%	4.52%	4.54%
Full vs. Delayed	66	70	3.88%						
	66 yrs. 2 mo.	70		3.74%					
	66 yrs. 4 mo.	70			3.58%				
	66 yrs. 6 mo.	70				3.38%			
	66 yrs. 8 mo.	70					3.15%		
	66 yrs. 10 mo.	70						2.87%	
	67	70							4.12%
Note: Optimal retirement age in **bold.**									

Table 6: Internal Rates of Return of Alternative Retirement Ages, by Birth Year, Gender, and Race									
Panel A1: Single White Males born in			**1943 - 1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
	Retirement Age1	Retirement Age2	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**
Early vs. Full	62	66	**4.51%**						
	62	66 yrs. 2 mo.		**4.61%**					
	62	66 yrs. 4 mo.			**4.75%**				
	62	66 yrs. 6 mo.				**4.84%**			
	62	66 yrs. 8 mo.					**4.93%**		
	62	66 yrs. 10 mo.						**5.04%**	
	62	67							**4.34%**
Early vs. Delayed	62	70	3.94%	3.95%	3.98%	3.99%	4.01%	4.04%	4.05%
Full vs. Delayed	66	70	3.37%						
	66 yrs. 2 mo.	70		3.20%					
	66 yrs. 4 mo.	70			3.00%				
	66 yrs. 6 mo.	70				2.76%			
	66 yrs. 8 mo.	70					2.49%		
	66 yrs. 10 mo.	70						2.15%	
	67	70							3.58%
Panel A2: Single Black Males born in			**1943 - 1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
	Retirement Age1	Retirement Age2	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**
Early vs. Full	62	66	**4.60%**						
	62	66 yrs. 2 mo.		**4.69%**					
	62	66 yrs. 4 mo.			**4.82%**				
	62	66 yrs. 6 mo.				**4.90%**			
	62	66 yrs. 8 mo.					**4.98%**		
	62	66 yrs. 10 mo.						**5.09%**	
	62	67							**4.45%**
Early vs. Delayed	62	70	4.13%	4.14%	4.17%	4.18%	4.19%	4.23%	4.24%
Full vs. Delayed	66	70	3.66%						
	66 yrs. 2 mo.	70		3.52%					
	66 yrs. 4 mo.	70			3.36%				
	66 yrs. 6 mo.	70				3.17%			
	66 yrs. 8 mo.	70					2.95%		
	66 yrs. 10 mo.	70						2.69%	
	67	70							3.89%
Panel A3: Single Hispanic Males born in			**1943 - 1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
	Retirement Age1	Retirement Age2	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**
Early vs. Full	62	66	**4.90%**						
	62	66 yrs. 2 mo.		**4.98%**					
	62	66 yrs. 4 mo.			**5.10%**				
	62	66 yrs. 6 mo.				**5.17%**			
	62	66 yrs. 8 mo.					**5.24%**		
	62	66 yrs. 10 mo.						**5.35%**	
	62	67							**4.75%**
Early vs. Delayed	62	70	4.44%	4.45%	4.48%	4.49%	4.50%	4.54%	4.55%
Full vs. Delayed	66	70	3.97%						
	66 yrs. 2 mo.	70		3.84%					
	66 yrs. 4 mo.	70			3.69%				
	66 yrs. 6 mo.	70				3.51%			
	66 yrs. 8 mo.	70					3.30%		
	66 yrs. 10 mo.	70						3.04%	
	67	70							4.22%

Table 6: Internal Rates of Return of Alternative Retirement Ages, by Birth Year, Gender, and Race (continued)									
Panel B1: Single White Females born in			**1943 - 1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
	Retirement Age1	Retirement Age2	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**
Early vs. Full	62	66	**4.94%**						
	62	66 yrs. 2 mo.		**5.03%**					
	62	66 yrs. 4 mo.			**5.14%**				
	62	66 yrs. 6 mo.				**5.21%**			
	62	66 yrs. 8 mo.					**5.28%**		
	62	66 yrs. 10 mo.						**5.38%**	
	62	67							**4.77%**
Early vs. Delayed	62	70	4.39%	4.40%	4.44%	4.45%	4.46%	4.49%	4.51%
Full vs. Delayed	66	70	3.83%						
	66 yrs. 2 mo.	70		3.68%					
	66 yrs. 4 mo.	70			3.51%				
	66 yrs. 6 mo.	70				3.31%			
	66 yrs. 8 mo.	70					3.07%		
	66 yrs. 10 mo.	70						2.78%	
	67	70							4.06%
Panel B2: Single Black Females born in			**1943 - 1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
	Retirement Age1	Retirement Age2	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**
Early vs. Full	62	66	**5.00%**						
	62	66 yrs. 2 mo.		**5.08%**					
	62	66 yrs. 4 mo.			**5.19%**				
	62	66 yrs. 6 mo.				**5.25%**			
	62	66 yrs. 8 mo.					**5.32%**		
	62	66 yrs. 10 mo.						**5.42%**	
	62	67							**4.84%**
Early vs. Delayed	62	70	4.52%	4.53%	4.56%	4.57%	4.58%	4.61%	4.62%
Full vs. Delayed	66	70	4.02%						
	66 yrs. 2 mo.	70		3.90%					
	66 yrs. 4 mo.	70			3.57%				
	66 yrs. 6 mo.	70				3.58%			
	66 yrs. 8 mo.	70					3.38%		
	66 yrs. 10 mo.	70						3.13%	
	67	70							4.26%
Panel B3: Single Hispanic Females born in			**1943 - 1954**	**1955**	**1956**	**1957**	**1958**	**1959**	**1960**
	Retirement Age1	Retirement Age2	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**	**Breakeven IRR**
Early vs. Full	62	66	**5.27%**						
	62	66 yrs. 2 mo.		**5.33%**					
	62	66 yrs. 4 mo.			**5.43%**				
	62	66 yrs. 6 mo.				**5.49%**			
	62	66 yrs. 8 mo.					**5.54%**		
	62	66 yrs. 10 mo.						**5.63%**	
	62	67							**5.12%**
Early vs. Delayed	62	70	4.80%	4.81%	4.84%	4.85%	4.86%	4.90%	4.91%
Full vs. Delayed	66	70	4.32%						
	66 yrs. 2 mo.	70		4.21%					
	66 yrs. 4 mo.	70			4.08%				
	66 yrs. 6 mo.	70				3.92%			
	66 yrs. 8 mo.	70					3.74%		
	66 yrs. 10 mo.	70						3.51%	
	67	70							4.55%

Note: Optimal retirement age in **bold.**

By gender and race.

Table 6 shows breakeven IRR for men and women by race. For all birth-year cohort groups, the highest IRR is at FRA. Women again have higher hurdle rates than men. Again white males have a lower IRR than black males who have a lower IRR than Hispanic males. Likewise, white females have a lower IRR than black females who have a lower IRR than Hispanic females.

CONCLUSION

Statistics show that approximately 72% of men and 75% of women retired early in 2009; a significant increase from previous years. Results of our studies show two optimal ages for retirement: age 64 and age 67. Various factors play into the retirement decision, but if early retirement is desired, one should wait until age 64. If an individual does not retire at age 64, then they should retire no later than age 67.

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APPENDIX A

Abbreviation	Meaning
COLA	Cost of Living Adjustment
DR	Discount Rate
DRC	Delayed Retirement Credit
ERA	Early Retirement Age
ET	Earnings Test
FRA	Full Retirement Age (receive full 100% of benefits)
IRR	Internal Rate of Return
PV	Present Value
SSA	Social Security Administration
SSB	Social Security Benefit