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JOURNAL OF INTERNATIONAL BUSINESS RESEARCH

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ARTICLES FOR VOLUME 3, NUMBER 1

ANTI-DUMPING MEASURES AND INTERNATIONAL PRICING POLICY: AN AUSTRALIAN STUDY

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ABSTRACT

The number of anti-dumping initiatives by governments all over the world has increased significantly during the recent years. This has a potential effect on the international pricing policy of firms.

This research focuses on the impact of the anti-dumping measures on the international pricing policy of firms and any strategic measures that the firms take to counter the anti-dumping actions. An a priori model of the impact of anti-dumping measures on international firm's pricing policy has been developed based on literature review and tested using structural equation modelling technique. Data for the research has been gathered from 178 Australian international marketers. Results of the study show that there is an agreement among the participating firms that the current anti-dumping laws of different countries are often confusing and there is no uniform definition of what may be called as ' dumping'. There is a general perception among the participating firms that more and more governments are using this as another non-tariff barrier.

Results of this study also show that international firms are finding concentrating in less sensitive product categories, cooperation with local competitors and differentiation through enhanced services and trading up as good strategic measures, to counter the effects of anti-dumping actions.

INTRODUCTION

International pricing is one of the most critical issues that international firms face. A potential obstacle for international pricing policies is the antidumping laws that increasing number of governments are using to counter dumping practices (Miranda, Torres and Ruiz, 1998). International firms need to take antidumping laws into account when determining their international pricing policies.

In developing a pricing policy a firm has to consider both external environment in which it has to compete and also the internal factors which condition and control the courses of action open to the firm. One of the major elements of an international firm's external environment for pricing purposes is host country's government policies of which antidumping measures are a part. A World Bank study showed that the impact of dumping duties in the United States manufactured goods

sector has boosted average tariffs in that sector from nominal 6 percent to actual 23 percent (The Financial Times, 1993). To minimise risk exposure to antidumping actions, international marketers might pursue various marketing strategies (Kostechi, 1991).

The research questions this paper addresses are: Do international marketers take into account antidumping measures in the host country while setting their international prices? Do they take any strategic measures to counter the anti-dumping impost?

CONCEPTUAL FRAMEWORK

The definition of dumping is usually pretty murky. Different economists have defined dumping differently. One approach defines imports as dumped if the products are sold below their cost of production. The other approach characterises dumping as selling goods in a foreign market below the price of the same goods in the home market. World trade Organisation defines dumping as "the sale of a product for export at a price below its 'normal Value'" (WTO, 2003). According to WTO definition "normal value" is usually the domestic price of the product in the exporting country. If this price cannot be used for comparison purposes, normal value may be calculated on the basis of the price of the product when sold to a third country, or as a constructed value including per unit fixed and variable costs plus reasonable amount for profits. Obviously, the definition is not clear-cut, and gives the host country advantage to take leverage out of the confusion.

The number of antidumping initiatives has increased in recent years. Most of the antidumping actions take place in the USA and the European Union countries. However, antidumping measures are increasingly initiated in other countries including the developing ones. The increased concern and enforcement by countries reflects the changing attitude among all countries towards dumping (Business Europe, 1996). Economists often equate this trend with protectionism (Bhagwati, 1988). The gradual removal of traditional trade barriers like tariffs and quotas has encouraged countries to increasingly use non-tariff barriers like antidumping measures to protect their home industries.

Local producers usually have advantages over the importers in case of antidumping litigations. This is because plaintiffs (local producers) usually face no penalties for baseless complaints. According to a recent editorial of the Australian Financial Review (Australian Financial Review, 2002) on Australia's anti-dumping law, "there is probably no such industry and it is no coincidence that Australia's anti-dumping law does not actually require the complainant to show predation". The complaint handling process is lengthy and often the importer has to submit a bond after preliminary investigation establishes possible case of dumping till the final outcome of the investigation. This increases the cost of the importers and as a result adds up to the price to the advantage of the local producer. Often though the final outcome is different from the preliminary findings. For example, according to the Productivity Commission of Australia, the Anti-Dumping Authority's investigations "resulted in a final finding different from the Custom's preliminary

finding in more than 40 per cent cases" (Australian Financial Review, 2002). Plaintiffs also have a home advantage (Bhagawati, 1988).

According to Anderson (1992) antidumping actions are often used as a tactical tool by countries to foster voluntary export restraints. Pricing tends to be relegated to a secondary role in the formulation of competitive strategies. To a large degree this is because price is highly visible and readily understood by consumers, competitors as well as governments. Anti dumping measures usually help drive up the price of the imported products to protect the local producers. Increasingly however, international marketers are using different tactical and strategic initiatives to counter the anti-dumping measures. Michel Kostecki (1991) recommends exporters to consider some marketing strategies to minimise risk exposure to anti-dumping actions. His recommended strategies include: (1) trading up from low-value to high-value products via product differentiation, (2) differentiate product by adding support services to core products, (3) reallocation of the firm's marketing efforts from vulnerable products to less sensitive products, and (4) entering into cooperative agreements with local competitors.

Overall, the following conceptual model can be drawn for this research:

Figure1: A Priori Structural Model:
Anti-dumping Measures and its Impact on International Firm Pricing Policy

METHODOLOGY

When one looks at the evolution of basic and applied knowledge in marketing, frequently, the progression is from a simple, unidimensional idea or concept into a more complex, multidimensional representation (Bagozzi, 1994). One way to represent multidimensional constructs is with a second-order confirmatory factor analysis (CFA), an approach taken in this research.

The characteristic of the data in this research required usage of multivariate technique(s). The statistical technique selected for this purpose is structural equation modelling (SEM). Structural Equation Modelling (SEM) has become a useful methodology for specifying, estimating, and testing hypothesised interrelationships among a set of substantive meaningful variables. Accordingly, the IMSP constructs developed through literature review and the a priori model developed based on the constructs was tested using SEM technique.

The target population was defined as Australian international marketers, both inbound and outbound. Questionnaires were sent to 500 randomly selected Australian exporters/importers of which 178 completed ones were returned. Respondents were asked to indicate a degree of their agreement or disagreement on an ordinal type 1-7 Likert scale with statements related to the research.

In a study of empirical research reports in international marketing, Aulakh and Kotabe (1992) found the mean sample size as 197.6 and response rate as 40.5 per cent. In this survey, out of the 500 companies 178 responded, giving a response rate of 35.6 per cent, which is close to the standard and expectations. After thorough editing of the 178 questionnaires returned, all of them were found satisfactory. In SEM, one approach is always to test a model with a sample size of 200, because 200 is proposed as being the "critical" sample size (Hair et al, 1992).

All data collected was codified and entered into EQS – the SEM software used, for final analysis. All SEM techniques are distinguished by two characteristics: (1) estimation of multiple and interrelated dependence relationships, and (2) the ability to represent unobserved concepts in these relationships and account for measurement error in the estimation process.

For the data set (N=178) a univariate kurtosis value >0.512 was not normal. Several variables yielded values greater than this, indicating some non-normality of the data. Therefore, the ML robust estimation method was used to re-estimate the model, as the robust estimation is more suitable when the data is suspected of being non-normal (Bentler, 1995). The robust method also provides robust standard errors, which have been corrected for non-normality (Byrne, 1994).

RESULTS

No problems were encountered in running the a priori structural model. The distribution of standardised residuals for this model was symmetric and was optimally dispersed suggesting good specification of the a priori model. Further, the model converged after only seven iterations. No

special problems were encountered during optimisation, and all parameter estimates were in order, indicating successful convergence. χ^2 (395, N = 178) = 598.543, p < .001, the Comparative Fit Index (CFI) 0.978, Robust Comparative Fit Index (RCFI) 0.981, Bentler-Bonett Normed Fit Index (BBNFI) 0.950, and Bentler-Bonnett Nonnormed Fit Index (BBNNFI) 0.978, indicated a good fit for the model. Moreover, all the t-ratios were significant (more than 1.96). Wald test did not support dropping any of the parameters. Thus all variables were retained. In most instances, the association in a structural equation model are necessary but not sufficient evidence of causality. In other words, one might argue that a particular model is consistent with a set of causal propositions, although the data on which the model is based might be equally consistent with other causal propositions. In the end, associations in structural equation models are interpreted no differently from associations in traditional statistical models. Accordingly, the appropriate inference is that variables are reliably associated in the context of the model but the exact nature of the association cannot be demonstrated.

Table 1 shows the factor loadings and the t-ratios where as table 2 shows the univariate statistics.

Table 1: Factor Loadings and t-ratios

F1	Antidumping measures: (external factor)	Factor Loading	t-ratio (Robust)
V1	Antidumping action is often utilised as a tactical tool to foster voluntary export restraint (VER)	0.554	3.884
V2	There is huge power imbalance between plaintiffs (local producers) and defendants	0.517	3.325
V3	The concept of "fair" price is usually murky	0.620	3.984
V4	Number of antidumping actions is rising.	0.642	4.014
F2	Marketing Strategies (internal factor)	Factor Loading	t-ratio (Robust)
V5	Trading-up	0.644	3.772
V6	Service enhancement	0.628	3.401
V7	Establishment of communication channels with local competitors	0.520	2.983
V8	Entering into cooperative agreements with competitors	0.532	3.120
V9	Reallocation of the firm's marketing efforts from vulnerable products to less sensitive products	0.638	4.121

Table 2: Univariate Statistics		
Variable	Mean	Standard Deviation
V1	5.4410	1.2353
V2	5.4308	1.2755
V3	5.5967	1.1161
V4	5.8667	1.1018
V5	5.8771	1.2406
V6	5.5990	1.2383
V7	5.4312	1.6575
V8	5.4340	1.5969
V9	5.8772	1.1260

The distribution of the model was optimally symmetric and centred around zero suggesting no problem in the specification of the model. Based on the findings of this research the a priori model shown in Figure 1 is confirmed as the model of the host country's anti-dumping measures and its impact on international firm's pricing policy.

CONCLUSION

Results of this study show that there is a widespread agreement among the international marketers that the current anti-dumping laws are often confusing and there is a lack of clear-cut definitions of "fair" price and dumping. This is giving governments opportunity to use the measure as another non-tariff barrier. Governments are increasingly using the anti-dumping measures, often unduly, in favour of their domestic industries. The implication of this is that, to make international trade a leveller playing field WTO should try to standardise the definition and application of the anti-dumping laws among the member countries.

Though the current anti-dumping laws are generally viewed negatively by the international marketers, according to the findings of this study, they have accepted such laws as part of reality in the market place and takes appropriate strategic measures while developing their international pricing policy. Such strategic measures include, concentrating in less sensitive product categories, cooperation with local competitors and differentiation through enhanced services and trading up. These strategies reflect their perception that governments often use anti-dumping measures as a tool

for voluntary restraint. Accordingly international marketers take pricing measures that are more acceptable to the local competition and government. However, such strategies are not suitable to many international marketers, particularly those from the developing countries that can compete only on the basis of low price strategies taking advantage of their generally low cost base. Further research needs to be carried out to establish whether the current anti-dumping laws disadvantage such firms.

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TRENDS IN TECHNOLOGY SKILLS AND INTERNET USAGE IN SELECTED EUROPEAN BUSINESS SCHOOLS

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ABSTRACT

Due to the constant and rapid evolution of technology, universities are caught in an on-going balancing act. Universities must provide students with current technology to enhance technical skills as well as keep up with computer hardware and software upgrades. Schools must also provide for instruction and instructional materials that further the knowledge and skills students possess (Holmes, 1999). The current research investigates the technology skills and Internet usage of students enrolled in a cross-section of business classes at selected European universities. Research results indicate that computer use does not vary significantly among the surveyed European business schools. However, there are significant differences in computer ownership by the students. There are also significant differences in access to the Internet by students from inside, as well as outside, their respective universities.

INTRODUCTION

The technologies underlying the Internet and telecommunications have increased information flow among countries, thus speeding globalization. At the same time, the spread of free markets has promoted greater competition worldwide, creating strong incentives for domestic producers to adopt new technologies. International change and competition have created a need for workers who are educated and highly skilled. According to Sabo (1999) technology rules how business is conducted. The Web enables the delivery of highly personalized, individual products in a timely manner. In addition to demanding increased skills, employers will also demand a more flexible workforce (Editor-1, 2000).

The pervasiveness of microcomputers in the business world places increased importance on the implementation of technology in higher education. A primary objective of university business schools is to prepare students for the world of business by giving them theories and tangible skills

that can be applied to their future careers (Levsen and Goettel, 1997). Students must become lifelong learners of information in regard to emerging technologies (Rath, 1999). Because the importance of technology skills is widely accepted, governments are advancing agendas to enable students to become computer literate (Eisenberg and Johnson, 1996).

Literacy Defined

Computer literacy can be defined as an understanding of basic hardware configurations and knowledge of applications software commonly used in the work environment. Information technology literacy includes the managerial, organizational, and social issues involved in the use of computers in information systems. Information technology literacy encompasses computer literacy (Levsen and Goettel, 1997).

Bruce (1999) broadly defines information literacy as "the ability to recognize information needs and identify, evaluate and use information effectively". The Association of College and Research Libraries (ACRL) defines information literacy as a set of abilities requiring individuals to "recognize when information is needed and have the ability to locate, evaluate, and use effectively the needed information"(ACRL, 2002). Society is faced with a challenge due to the uncertain quality and expanding quantity of information. An informed citizenry is not created by the sheer abundance of information. Citizens must be equipped with a complementary cluster of abilities that enable them to use information effectively (ACRL, 2002).

Information literacy forms the basis of life-long learning and is common to all disciplines. Although a significant overlap exists with information technology, information literacy is a distinct and broader area of competence. Developing life-long learning skills is central to the mission of higher education institutions (ACRL, 2002).

European Commission's Initiative

The European Commission's (EC's) "Action Plan for eEurope" states "that by the end of 2002 it will create the foundation needed to bring Internet access to every European citizen, school and business" (DeBony, 2000). The EC believes that the competitiveness of the EU economy is dependent on rapid access to the Internet and the spread of e-commerce. The main objectives of the EC plan are: the introduction of a faster, cheaper Internet; investment in developing people's online skills; and stimulation of Internet use (DeBony, 2000).

The commitment to new educational technology demonstrated by both the EC and the government to utilize new educational technologies is "something Americans can only dream of" (Dunn, 2001). The EU has committed 10 percent of all funds available in its education and training programs to e-learning; about 300 million euros (Dunn 2001). Data indicates that European

providers are catching up with their US competitors. Europe's approach often includes collaboration with European and global companies and often with a lower-cost product (Editor-2, 2002).

The Role of the University

Increasingly, universities are requiring the integration of computers into their curricula for all disciplines. Some universities require students to purchase computers prior to admission (Ceccucci and Gius, 1997). Furthermore, Gardner and Carr (1996) state:

> *It is expected that every student graduating will have a level of knowledge of information systems and computer usage that will enhance their attractiveness to potential employers. These same skills also give them tools that will enhance their personal life in our technology heavy world.*

The convergence of computers and digital technology is transforming the way we create, store, distribute, and retrieve information. Communication technologies have a dual capacity in organizations—the capability to automate (increase speed) and "informate" (increase efficiencies) (Gardner & Carr, 1996). These advances in telecommunications are affecting education in two ways: redefining what society expects of education while promising to transform the teaching and learning process within the classroom. Computer labs and multimedia centers can be found on most campuses and universities worldwide are responsible for providing Internet access to millions of students (Gardner and Carr, 1996).

The digital revolution is definitely impacting higher education. Students must have confidence in their ability to use computer technologies in order to engage them in their future (Bandura, 1977). Because of the constant and rapid evolution of communications technology, universities are caught in an on-going balancing act. Schools must provide students with current technology to enhance technical skills as well as keep up with computer hardware and software upgrades. Schools must also provide for instruction and instructional materials that further the knowledge and skills students possess. Computer technology has become a necessity rather than a luxury in the classroom. Educators face a period of rapidly changing skills requirements, rising expectations, and high levels of investment, scrutiny, and accountability (Simpson, et al., 1999).

Student Expectations

Students themselves recognize the importance of technology-based training. As technology evolves, so does the background of university students. According to Nagarajan (1996) students increasingly recognize the role information systems play in their chances for career success after

graduation. This results in higher expectations of more computer coverage in the curricula and improved computer and library resources in computer literacy (Nagarajan, 1996). Despite increasing student expectations regarding computer resources on campus, it is presently unclear how long it will take for computer-based learning to become truly integrated into all courses in all business disciplines. Obstacles hindering technology implementation include the cost of hardware and software, resistance of professors to change, limited technology training for professors, and the controversy over technologies' contribution to learning (Ceccucci and Gius, 1997). Eisenberg and Johnson (1996) report some encouraging signs. Among these are the increasing popularity of integrating computers into content areas. Administrators are recognizing that computer skills should not be taught in isolation only. Effective integration of information skills requires that the skills must directly relate to the content area and to classroom assignments, and that the skills themselves are tied together in a logical and systematic information process model. This application of computer skills as part of the learning process results in the development of true "computer literacy" (Eisenberg and Johnson, 1996).

PURPOSE AND METHODOLOGY

The purpose of this study is to determine student computer use and Internet access, both in and out of the classroom, as well as uses made of the Internet in selected European Business schools. A 25-question instrument was distributed to eight different business schools in the following countries: Ireland, England, Spain, France, Belgium, Germany, Finland, and the Netherlands. Questionnaires were returned from all of the schools with the exceptions of Finland and the Netherlands. The questions consisted of the following formats: "yes-no, ranking, multiple-choice, and fill-in-the-blank". Professorial contacts in each of these schools were asked to distribute the questionnaires to one, or more, of their business classes. The six responding schools provided a total of 438 usable questionnaires: the University of Ireland (Galway) provided 67, or 15.3 percent; the University of Luton (England) 90 (20.5 percent); the Universitat de Vic (Spain) 58 (13.2 percent); the University at St. Etienne (France) 67 (15.3 percent); Universite De Mons-Hairaut (Belgium) 94 (21.5 percent); and Bielefield University (Germany) 62 (14.3 percent).

About 82.5 percent of respondents were from colleges or schools of business. The others, while perhaps enrolled in a business course, were from other programs, such as health and applied sciences, education, and the natural sciences. Of the 438 respondents, there were 76 persons from nations other than the six host countries. Most Western European universities have structured their business programs as three year degrees. Students participating in our study were as follows: 1st year - 24 percent; 2nd year - 31 percent, 3rd year - 41 percent, and 4th year and "other" - 4 percent, with 52 percent female and 48 percent male.

Only about 40 percent of respondents hold jobs while in school , with the majority working 20 or fewer hours per week. Of those who do work, 58.1 percent report using a computer at work.

As anticipated, word processing software was most frequently used, and CAD-CAM software was least frequently used. Chi-square tests indicated that Internet usage (sig. = .007), CAD-CAM (sig. = .027), Spreadsheets (sig. = .065), and Presentations (sig. = .093) differed significantly among countries. There were no significant differences in the use of word processing, graphic design, or database management program usage.

RESULTS

This section places all of the data in tabular format with accompanying comments and Chi-Square results. Table 1 indicates no significant differences in student computer usage among the schools, with only 4.4 percent separating the "lowest" school, England, at 95.6 percent from the two "highest" – France and Germany – at 100 percent. More variance was observed, as expected, in regard to computer ownership. Only 37.9 percent of the Irish students reported computer ownership, while 94.8 percent of the Spanish students owned their own computer.

Wide variance was also observed regarding "outside" Internet access. About thirty-nine percent of the Irish students had Internet access outside their university, while about 74 percent of the German students did. Approximately ninety-eight percent of the French students had a university Internet account, while only about 65 percent of the Belgian students had a university Internet account. Table 1 contains the data.

Table 1: Technology Use in European Universities

Item	Belgium	England	France	Germany	Ireland	Spain
Response	Yes %	Yes %	Yes %	Yes %	Yes %	Yes %
Do you use a computer?	98.9	95.6	100.0	100.0	98.5	96.6
Do you have your own computer?	78.7	63.2	78.8	93.4	37.9	94.8
Do you have access to the Internet outside the university?	40.4	51.7	53.7	73.8	39.4	48.3
Do you presently have an Internet account at the university?	64.9	72.4	98.5	83.6	97.0	96.5

Table 2 indicates that the English students are very familiar with Internet assignments, while almost none of the Spanish students were. This is interesting, in that, as previously indicated, almost all (96.5 percent) of the Spanish students had university Internet accounts, while only about 72 percent of the English students did. The French and German students are heavy Internet researchers, with students at the other four schools using Internet research to a lesser degree. It is surprising, with Hot Mail, and other free e-mail services available, that all of the students didn't "score" in the 90+ percentile regarding e-mail usage. The Belgian students reported less than 70 percent coverage in this area. Likewise, only about 37 percent of the French students reported using the Internet for entertainment purposes, and the average of students at all schools was only about 57 percent.

Table 2: Purposes for Using the Internet (Percentage Indicating Use)

Country	Assignments	Research	E-Mail	Entertainment	Other
Belgium	45.5%	75.0%	65.8%	53.9%	15.8%
England	76.9%	83.1%	89.2%	61.5%	9.2%
France	19.4%	95.5%	94.0%	37.3%	9.2%
Germany	36.4%	94.5%	92.7%	60.0%	16.4%
Ireland	51.5%	65.2%	97.0%	63.6%	6.1%
Spain	7.1%	51.8%	73.2%	67.9%	5.4%
Average	40.4%	77.7%	84.9%	56.9%	10.4%

Table 3 shows the frequency of Internet usage, ranging from "never," to "daily." Some (16 percent) of the Belgian students indicated they never used the Internet, which again, is difficult to believe. This is contrasted with some of the French students (about 35 percent) who use the Internet daily. One of several followup studies on this topic are planned, including a study with the same questions as were asked of these European students being asked of U.S. students. It is hypothsized that American students will show much higher rates of Internet usage than their European counterparts due to lower cost Internet access. A Chi-Square test indicated that frequency of use of the Internet was dependent upon the host country. The significance level was <.000.

Table 3: Frequency of Internet Use					
Country	Never	Daily	Weekly	Less Than Once a Month	Once a Month
Belgium (n = 75)	16.0%	17.3%	32.0%	18.7%	16.0%
England (n = 63)	9.5%	23.8%	58.7%	3.2%	4.8%
France (n = 66)	1.5%	34.8%	56.1%	6.1%	1.5%
Germany (n = 55)	1.8%	8.2%	36.4%	3.6%	0.0%
Ireland (n = 64)	0.0%	21.9%	70.3%	1.6%	6.3%
Spain (n = 55)	5.5%	5.5%	49.1%	18.2%	21.8%
Average	6.1%	26.5%	50.3%	8.7%	8.5%

There may or may not be some apparent discrepancies in the data in regard to Internet assignments. As reported in Table 2, about 77 percent of the English students reported using the Internet for Assignments, yet only about 53 percent indicate Assigned Work on the Internet as Part of a Class (Table 5). The 77 percent could be using the Internet on their own initiative, whereas in Table 4, it is the teacher's perogative in making the Internet assignment mandatory. Belgian teachers appear to be making more Internet assignments than teachers in the other countries business schools, with the Spanish professors making the fewest. The frequency of assigned work on the Internet was dependent upon the host country. The significance level was <.000.

Table 4: Assigned Work on the Internet as Part of a Class		
Country	Yes	No
Belgium (n = 80)	71.3%	28.8%
England (n = 59)	52.5%	47.5%
France (n = 64)	56.3%	43.8%
Germany (n = 53)	58.5%	41.5%
Ireland (n = 62)	69.4%	30.6%
Spain (n = 56)	21.4%	78.6%
Average	56.1%	43.9%

The French students preferred Internet assignments nearly 2 to 1 over their Irish counterparts. The desirability of more assignments using the Internet was dependent upon the host country. The significance level was <.000. All of this data is shown in Table 5.

Table 5: Preference for Internet Assignments

Country	Yes	No
Belgium (n = 62)	62.9%	37.1%
England (n = 38)	50.0%	50.0%
France (n - 49)	89.8%	10.2%
Germany (n = 40)	65.0%	35.0%
Ireland (n = 54)	48.1%	51.9%
Spain (n = 29)	72.4%	27.6%
Average	64.3%	35.7%

CONCLUSIONS AND SUGGESTIONS FOR FUTURE RESEARCH

The survey results indicated there are no significant differences among students with respect to use of a computer, or the particular purposes for which they use computers. However, there are significant differences in computer ownership, Internet access both inside and outside of the university, as well as with frequency of Internet use. There are also significant differences regarding Internet assignments for class projects, and the desire for more such projects. A followup study is planned on computer accessability and usage at the secondary school level, as well as at the university level for these same six schools.

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WTO/GATT TRADE ROUNDS: PAST AS PROLOGUE

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ABSTRACT

This research examines the processes and outcomes of trade rounds. The examination includes a review of each of the General Agreement on Tariffs and Trade (GATT) trade rounds and their periods of activity, objectives, and contributions. Then, the paper examines the World Trade Organization's Ministerial Conferences and reviews their objectives and outcomes. Finally, the paper reviews the status of the WTO's Doha Round and questions whether the GATT experience is prologue to successful WTO trade discussions.

INTRODUCTION

On January 1, 1995, a new multilateral trade organization emerged on the world's stage, the World Trade Organization (WTO). Its prime objective is to strengthen the world trading system and, in this regard, it aspires to be more effective than the General Agreement on Tariffs and Trade (GATT), the organization it replaced. As stated succinctly on its website (WTO About, 2003), "the World Trade Organization is the only global international organization dealing with the rules of trade between nations. At its heart are the WTO agreements, negotiated and signed by the bulk of the world's trading nations and ratified in their parliaments. The goal is to help producers of goods and services, exporters, and importers conduct their business."

OBJECTIVE OF THE RESEARCH

At this time now, the WTO is involved in a round of trade discussions. These discussions, formally titled the Doha Development Agenda but known popularly as the Doha Round, initiated in November 2001 at a WTO Ministerial Conference in Doha, Qatar and hope to conclude by January 2005 (*The Economist*, 2003a; WTO Doha, 2001; WTO Doha, 2003). The Doha Round opens "against long odds" with support of the United States working with the European Union and other countries (Zoellick, 2002). Prior to Doha, the world trading nations participated in eight rounds of trade talks under the GATT.

The objective of this research is to examine multilateral trade negotiations by reviewing previous GATT trade rounds as a way of underpinning an understanding of the WTO's Doha Round. The examination of GATT includes a review of each GATT round, its period of activity, objectives, and contributions. Then, the paper examines the WTO Ministerial Conferences and reviews their

objectives. Finally, a review of the status of the Doha Round and a question of whether the GATT is prologue to the success of present WTO trade discussions.

GATT AND THE WTO

The General Agreement on Tariffs and Trade (GATT) is an ad hoc, provisional organization created in the late 1940s after the world trading nations failed to implement an International Trade Organization (Cooper, 1994; Kehoe, 1998). The GATT operated from 1947 until the emergence of WTO on January 1, 1995. Upon the creation of the WTO, the GATT no longer exists as an organization, but continues as an agreement updated in the Uruguay Round (discussed below).

GATT organizationally now is an agreement administered by the WTO. It deals primarily with trade in goods. Three other agreements in the WTO, a General Agreement on Trade in Services (GATS), an Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), and an Agreement on Trade-Related Investment Measures (TRIMs) involve respectively services, intellectual property, and investment issues in world trade (Kehoe, 1998; Denis, 2003). In summary, the World Trade Organization administers four agreements - the GATT, the GATS, the TRIPS, and the TRIMs as well as providing a forum for trade negotiations, mediating trade disputes, monitoring national trade policies, providing technical assistance and training for developing countries, and cooperating with other international organizations (Kehoe, 1998; WTO and GATT, 1998; Denis, 2003; WTO About, 2003).

As of April 4, 2003, the World Trade Organization has 146 member countries and 30 observer countries that are required to begin accession negotiations within five years of becoming observers (WTO About, 2003). Decision-making in the WTO is by consensus among the 146 countries. When consensus is not possible, decisions carry on a two/third majority vote on a one-country, one-vote basis. Voting is necessary on an interpretation of a trade agreement or to waive an obligation of a member. Voting occurs also in situations to amend provisions of an agreement, to admit a new member to the organization, and/or to accept provisions of a trade round, as in the case of the Doha Round (WTO Decisions, 2003). Similarly, under GATT, voting occurred for much the same reasons.

OVERVIEW OF THE GATT ROUNDS

The GATT conducted eight rounds of multilateral trade negotiations from 1947 to 1993. While some of the rounds took extra time, most eventually had successful conclusions with a reduction in tariffs and solidifying rules governing world trade solidified (Pitroda, 1995). The GATT rounds provided a venue, a process, and an atmosphere that facilitated multilateral trade negotiations. Naming each round either for the place where a round's discussions initiated or for an individual whose actions encouraged a particular round.

The focus of earlier GATT rounds primarily was about reducing tariff levels in the world, while later rounds were about a wide range of trade issues, including trade in services; the protection of intellectual property through international rules for the protection of patents, trademarks, and copyrights; issues of agriculture subsidies; development and implementation of anti-dumping codes; and trade dispute settlement procedures. The GATT rounds reviewed here are in chronological order. Much of the information about the GATT rounds is from research by Kehoe (1998) as well as from WTO/GATT reports such as a WTO/GATT Chronology (1998).

GATT's first round (the Geneva Round) of multilateral trade negotiations held in Geneva, Switzerland was conducted in three parts from April to October 1947, February to March 1948, and August to September 1948. The first part of the round involved the world's trading nations attempting to develop an International Trade Organization. The twenty-three nations charged with developing an ITO charter engaged in multilateral trade negotiations during the period April to October 1947. While the ITO did not become an entity due to the failure of national legislatures to ratify its charter, the nations charged with drafting the charter were in a setting for trade discussions. These discussions resulted in 20 tariff reduction schedules being negotiated affecting an estimated $10 billion in world trade evolved (The Roots of the WTO, 1998). The second part of GATT's first round occurred when delegations from 53 countries met in Havana, Cuba to consider the ITO draft charter. At that time, the contracting parties held their first formal discussions following the creation of the GATT. The third session of the round was in Geneva in August/September, 1948, following the relocation of the GATT Secretariat from Lake Placid, NY to Geneva, Switzerland.

Thirteen countries participated in the second GATT round (the Annecy Round) in Annecy, France from April to August 1949. Discussions primarily were about reductions in tariffs. The round's results were in 5000 tariff concessions offered and the inclusion of ten additional countries in GATT. During this round the United States announced that the ITO charter would not be ratified by the U.S. Congress, which meant that the International Trade Organization would not be a realty, thereby leaving the GATT as the world's only multilateral trade organization.

From the continent, GATT moved to Torquay, England for its third round of trade negotiations (the Torquay Round) conducted from September 1950 to April 1951. Thirty-eight countries participated in the round.

The GATT returned to Geneva, Switzerland for its fourth round of trade negotiations (once again named the Geneva Round) from January to May 1956. Twenty-six countries participating agreed to approximately $2.5 billion in reductions of tariffs.

Honoring U.S. Secretary of State Douglas Dillon, the GATT's fifth round (the Dillon Round) in September 1960 to July 1962 focused primarily on a particular area of the world, Europe. Early in the round, GATT participants negotiated a single schedule of Common External Tariff concessions for the European Economic Community. Then, the round turned to developing further worldwide tariff reductions. Results negotiated were approximately 4400 tariff concessions involving $4.9 billion in trade.

Named in honor of U.S. President John F. Kennedy, the Kennedy Round from May 1964 to June 1967 had 50 countries participating. The round is notable for adoption of an across-the-board linear method of tariffs reduction, abandoning the traditional product-by-product approach used in earlier rounds. A Code on Anti-Dumping was developed during the round and a 50% cut in tariff levels in many areas of trade resulting in approximately $40 billion in tariff concessions.

From September 1973 to November 1979, ninety-nine countries participated in the Tokyo Round of trade negotiations. Among areas in which agreements were reached were subsidies and countervailing measures, import licensing procedures, government procurement procedures, a revision of the anti-dumping code, and policies concerning trade in meat, dairy products, and civil aircraft.

Tariff reductions of more than $300 billion were realized as the result of the seventh round, including a 35% reduction mutually between the U.S. and the European Community and a 40% reduction by Japan on U.S. imports to Japan (McKinney, 1991). Additionally, enacted was an agreement on liberalizing international trade in textiles, the Multifabric Agreement. This agreement superseded an earlier short-term agreement on international trade in fabrics in place since 1961.

The impetus for the eight and final GATT round, the Uruguay Round, emerged at a GATT ministerial meeting at Punta del Este, Uruguay in fall 1986. At that meeting, GATT ministers initiated the eight round, the Uruguay Round, on September 20, 1986 with 117 participating nations. The Uruguay Round would run from September 1986 to December 1993.

Planned to take approximately four years, among areas selected for negotiation during the Uruguay Round were tariffs, non-tariff barriers, protection of intellectual property and trade of counterfeit goods, trade-related investment measures, agriculture subsidies, safeguards, tropical products, natural resource products, and textiles and clothing. Additionally, the agenda included a review of GATT articles, examination of the GATT dispute settlement procedures, the functioning of the entire GATT system, and a review of the Tokyo round's agreements.

Serious issues inhibited the round's progress. A global recession caused governments to impose import duties to protect jobs threatened by foreign competition, thereby causing an unpleasant environment for discussing trade issues (Sutherland, 1993). A major issue of contention was agriculture, an area of national sensitivity for some countries. Given its sensitivity, the GATT Rules of Conduct did not consider trade in agriculture, and many countries had independent policies for agriculture trade and subsidies (Clark, 1993).

Another difficult issue was protection of intellectual property. The United States favored protection, with other nations resisting regulations. Developed and developing countries took opposing positions. Developed countries favored intellectual property protection by the GATT. Developing countries argued that intellectual property is a concern of the World Intellectual Property Organization and not of the GATT.

On December 15, 1993, GATT ministered concluded discussions and signed a final GATT agreement on April 15, 1994 in Marrakech (Hage & Impoco, 1994). The Uruguay Round cut tariffs

on a wide variety of goods, provided enhanced protection for patents and copyrights (Bowen, 1992), and became the basis for the World Trade Organization established on January 1, 1995.

WTO MINISTERIAL CONFERENCES

The GATT sponsored eight rounds of multilateral trade discussions bringing nations together to facilitate trade. At the conclusion of the eight round, the GATT gave way to the emergence of the WTO. Today, headquarters of the WTO is in Geneva, Switzerland.

A General Council manages the WTO and is its second highest-level decision-making body, meeting regularly to carry out the functions of the WTO with the authority to act on behalf of the WTO Ministerial Conference, the highest-level WTO authority. The WTO Ministerial Conference meets every two years (WTO General Council, 2003; WTO Organization, 2003). Thus far, there have been four WTO ministerial conferences beginning in 1996 in Singapore, with a fifth conference upcoming during September 2003. Below is a brief review of the ministerial conferences.

World Trade Organization members from 120 countries as well as countries acceding to the WTO participated in the first WTO Ministerial Conference in Singapore from December 9 to 13, 1996. The first conference since the WTO emerged on January 1, 1995, it examined the performance work of the WTO's first two years of activity and the implementation of the Uruguay Round Agreements. (WTO Singapore, 1996)

The second WTO Ministerial Conference was in Geneva, Switzerland between May 18 to 29, 1998. This conference reviewed the work of the WTO, including a continued review of progress under the Uruguay Round agreements. The following statement contains a particular concern at the conference (WTO Geneva, 1998). "We remain deeply concerned over the marginalization of least-developed countries and certain small economies, and recognize the urgent need to address this issue which has been compounded by the chronic foreign debt problem facing many of them."

Protests in the streets at the third WTO Ministerial Conference in Seattle, Washington November 30 to December 3, 1999 brought an early adjournment. It is at this conference that the WTO considered the need for a formal round of trade discussions and made ready for the decisions to be taken at Doha at its next ministerial conference (WTO Seattle, 1999)

The fourth WTO Ministerial Conference in Doha, Qatar from November 9 to 14, 2001 authorized the Doha Development Agenda, known popularly as the Doha Round of trade negotiations. A declaration of the Fourth Ministerial Conference (the Doha Declaration) provides a mandate for negotiations on a range of subjects in the Doha Round, including issues concerning the implementation of present trade agreements in the world. The Doha Round's negotiations will take place in the WTO's Trade Negotiations Committee and/or its subsidiaries (WTO Doha, 2001; WTO Trade Negotiations Committee, 2003). A very public aspect of the Ministerial Conference was China's request for membership. China's WTO application was approved at Doha on November 10, 2001.China became the 143rd WTO member on December 11, 2001 (WTO China, 2001).

The agenda for the fifth WTO Ministerial Conference in Cancun, Mexico on September 10 to 14, 2003 intended to continue a program of work in trade negotiations initiated under the Doha Development Agenda/Doha Round (WTO Cancun, 2003a). The conference particularly focused on trade in agriculture, given that the Doha Round failed on March 31, 2003 to agree to agriculture negotiating modalities (WTO News, 2003). The hope was that the meeting in Cancun could revive a spirit of cooperation concerning trade in agricultural products.

Such a sprit of cooperation did not materialized and the trade talks among 146 nations in Cancun collapsed in the early morning hours of September 14, 2003 over what are called the Singapore issues of trade and investment, trade and competition policy, transparency in government procurement, and trade facilitation (WTO Cancun, 2003b). In actuality and more specifically, the talks collapsed over an issue of by how much rich countries were willing to reduce farm-subsidy programs (King & Miller, 2003). As summarized by Becker (2003), "the immediate cause of the brerakdown was proposed new trade rules for investment and government procurement (i.e., the Singapore issues), which had been promoted by the European Union but opposed by the poorer nations. But agriculture was the pivotal issue." Poorer nations objected to the estimated $300 billion in subsidies paid to farmers each year in the world's richer countries. These subsidies make it difficult for farmers in the poorer countries to compete in the global market.

The collapse of the fifth WTO Ministerial Conference in Cancun on September 14, 2003 occurred after Chairperson Luis Ernesto Derbez concluded that despite considerable movement in consultations, members remained entrenched, particularly on the Singapore issues. The WTO website (WTO Cancun, 2003c) offers these hopeful words about future rounds of trade talks. In a six-paragraph ministerial statement, the WTO asks member governments' officials "to continue working on outstanding issues with a renewed sense of urgency and purpose and taking fully into account all the views we have expressed in this Conference. The ministers asked the General Council Chairman and the WTO Director-General, to coordinate this work and to convene a meeting of the General Council at senior officials level no later than 15 December 2003 to take necessary action. Director-General Supachai Panitchpakdi said there was no hiding the fact that the deadlock was a setback. He said he was disappointed but not downhearted. He said it is important to ensure the negotiations are put back on track. If the Doha Development Agenda fails, the losers will be the poor of the world, he said. He pledged to work hard for a successful outcome."

COMMENT ON THE DOHA ROUND

The World Trade Organization's Doha Round is part of a multilateral trade negotiation process. During the round, participating countries will place various proposals before the participants. For example, the United States is offering a proposal to eliminate all tariffs on manufactured goods by the year 2015, eliminating an estimated US$18 billion in tariffs that American consumers pay each year (Andrews, 2002; King, 2002). Other countries will offer similar

proposals during the round, which will be part of the agenda for the trade round (Doha Agenda, 2003).

The Doha Round is an important undertaking for world trade. It is a multilateral gathering of trading nations rather than a bilateral meeting of nations two at a time. There are significant reasons why multilateral trade negotiations are preferred to bilateral negations. First, one may posit that multilateral trade negations are more efficient than nations attempting bilateral meetings about trade. Put simply, bilateral negotiations, while easier than multilateral, have a "dubious trade-enhancing impact" than do multilateral trade discussions (*The Economist,* 2002b). Second, multilateral discussions enable participants from developing nations to have somewhat greater influence than if a developing nation is in a bilateral trade discussions with a more developed country (*The Economist*, 2003b). Third, global trade negotiations enable politically sensitive issues in world trade a venue for presentation in a global context rather than in a national or regional context. Fourth, multilateral negotiations allow issues a packaging approach so that unpopular issues from a member nation's domestic-policy viewpoint present in a package with more economically and politically attractive issues (Trade Rounds' Advantages, 1998).

How will the Doha Round unfold? Will it be harmonious or will serious issues inhibit progress? Recall, as discussed above, that in the GATT's Uruguay Round, agriculture was significant in inhibiting progress. Well, so too appears to be the situation in the Doha Round. In a March 31, 2003 negotiations meeting, WTO member failed to agree to a framework for agriculture trade reform. The framework involved establishing "modalities" or targets for achieving the objectives for negotiations in trade of agriculture. WTO Director General Supachai Panitchpakdi expressed disappointment about the failure to agree on agriculture negotiating modalities and encouraged government toward compromise on the issues involving agriculture (WTO News, 2003). A condition of disharmony continued in the Cancun Round with the trade talks collapsing on September 14, 2003, once again with an issue of trade in agriculture at the center of the disagreements.

Compromise on issues involving agriculture will be key to successful progress in the Doha Round. Otherwise, world trade may be "deadlocked in Doha" and the world nations may begin to focus on "trade-diverting bilateral or regional trade deals" (*The Economist,* 2003b). Hopefully, a spirit of compromise abounds and the Doha Round will conclude on schedule conclude by January 1, 2005.

PAST AS PROLOGUE

In the GATT, the world trading nations had a provisional organization that made possible a venue for multilateral trade discussions. In the WTO, the world hopefully has a permanent organization to facilitate continued development of multilateral trade as well as providing a venue for trade discussions. If this occurs, the past success of the GATT will be prologue to an equally successful future for trade under the WTO.

However, for the WTO, significant obstacles stand against a past as prologue setting. For one, many countries believe the WTO is too powerful and impinges on their national sovereignty. Other countries do not want to abide by ever increasing WTO rules. Yet, other countries dislike having bureaucrats in Geneva attempting to serve as an overarching policy body for trade. These and other complaints, both real and perceived, give rise to some member countries and non-member countries being in opposition to the WTO. Whether or not the past is prologue may rest in how well the WTO addresses its critics and articulates its benefits.

Critics of the WTO argue that it is a dictatorial tool of the rich and powerful, destroys jobs, and ignores the concerns of health, the environment and development. The critics can be vocal and, at times, disruptive, as in the case of the protests during the Seattle Ministerial Conference (Knapp, 1999; Korten, 1999; Lefevre & Newman, 1999). The following quote (Knapp, 1999) by a Seattle protestor perhaps illuminates some of the feelings against the WTO. "The WTO aims to eliminate what they are calling non-tariff trade barriers. A lot of those trade barriers are actually hard-won environmental and food safety protections."

In discussions with its critics, the WTO identifies ten common misunderstandings about its goals policies. A list of the misunderstandings is available on the WTO website together with WTO responses to each of the misunderstandings (WTO Misunderstandings, 2003). The common misunderstandings about the WTO include the following:

The WTO dictates policy to countries around the world.
The WTO is an advocate of free trade at any cost.
In the WTO commercial interests take priority over development.
In the WTO commercial interests take priority over the environment.
In the WTO commercial interests take priority over health and safety.
The WTO destroys jobs and causes poverty to worsen.
Smaller countries are powerless in the WTO.
The WTO forces weaker countries to join.
The WTO is a tool of powerful lobbying organizations.
The WTO is undemocratic in concept and actuality.

Supporters of the WTO argue that it is an important entity for advancing international comity and trade. Rather than a world of bilateral trade arrangements, the WTO facilitates multilateral trade

agreements that benefit consumers exponentially by lowering duties and tariffs. Benefits of the WTO include the following (WTO Benefits, 2003):

The WTO helps to promote peace by promoting trade among nations
The WTO provides a process to handle trade disputes constructively
The WTO rules make life easier for businesses and consumers
The WTO advocates free trade and free trade reduces the cost of living
The WTO enables a wider choice of product and services for the world's consumers
In advocating free trade the WTO facilitates increases in incomes
In advocating free trade the WTO stimulates economic growth
The basis principles of the WTO make life more efficient
Through membership in the WTO governments are shielded from trade lobbyists
The WTO system encourages good government.

CONCLUSION

An article in The Economist (2002a) noted "the WTO and its predecessor the General Agreement on Tariffs and Trade helped to boost global trade by encouraging countries to lower their tariff barriers in successive rounds of trade negotiations." At the First WTO Ministerial Conference in Singapore, the WTO affirmed its vision and commitment to fostering global trade in the following statement (WTO Declaration, 1996). "In pursuit of the goal of sustainable growth and development for the common good, we envisage a world where trade flows freely. To this end, we renew our commitment to a fair, equitable and more open rule-based system; progressive liberalization and elimination of tariff and non-tariff barriers to trade in goods; progressive liberalization of trade in services; rejection of all forms of protectionism; elimination of discriminatory treatment in international trade relations; integration of developing and least-developed countries and economies in transition into the multilateral system; and the maximum possible level of transparency."

The GATT, a creation of the Atlantic nations (Bergsten, 1994), served the world effectively for decades. The WTO is a creation of 129 member nations of the GATT (WTO and GATT, 1998). Its origins are geocentric; it is of the world and for the world. Given its origins, one may posit that the WTO better will embrace the nations of Latin America and the Asia-Pacific than did the GATT.

Particularly China, a nation that in 1995 was the second largest recipient of foreign direct investment in the world (Tse, Pan & Au, 1997), and whose "emergence is seen as the economic event of the decade" (Czinkota & Ronkainen, 1997, 831), needs to be welcomed in the global trade arena. As noted above, approval of China's WTO application at Doha on November 10, 2001 enabled China to become the 143rd member of the WTO on December 11, 2001 (WTO China, 2001).

So, will the past be prologue to a better future for world trade? In considering this question, reflection on a statement by a former WTO Director General Michael Moore is instructive (Moore, 1999). "The real question we should ask ourselves is whether globalization is best left unfettered, dominated by the strongest and most powerful, the rule of the jungle, or managed by an agreed system of international rules, ratified by sovereign governments." The WTO provides the mechanism and venue for developing and implementing an agreed system of international rules. The past indeed is prologue, or so it seems!

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THE RELATION BETWEEN GROWTH AND INFLATION RATES IN LATIN AMERICA

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ABSTRACT

Inflation has long been a problem for countries in Latin America. While some countries have made progress in addressing the problem, other countries have not been able to achieve sustained economic growth. Keynesian thought posits the notion that inflation and growth can be positively related, while other theories suggest that inflation is detrimental to long-run growth. Various empirical studies yield conflicting results. This study applies two Granger causality tests to seventeen Latin American countries in order to determine possible long-run relations. For most of the countries, no causality is found, while unidirectional causality and bi-directional causality is found in a limited number of countries.

INTRODUCTION

Historically, many Latin American countries have been plagued by inflation problems though the problem has not been universally severe. During the past few decades, some of the countries have made considerable progress toward controlling inflation while others still struggle in the battle against inflation. Some countries in the region have also encountered difficulties in maintaining respectable economic growth rates. The purpose of this paper is to explore the relations that appear to exist between inflation and economic growth in selected Latin American countries and to note some of the econometric problems that exist in analyses of this nature.

There is far from universal agreement regarding the relation between inflation and economic growth, and this relation has long held a central position in macroeconomics. The traditional Keynesian view would hold that inflation can act as a stimulus to economic growth. This view is typically expressed through a short run Phillips curve tradeoff (Paul, Kearney & Chowdhury, 1997) that arises due to sticky prices and wages. Thus, in the short run, faster real growth may be associated with inflation (Motley, 1998). However, the Phillips curve tradeoff tends to disappear as economic agents are able to anticipate price changes. These views were especially prominent in the 1960's and continued into the 1980's (Bruno & Easterly, 1996).

There are strong arguments that inflation is detrimental to economic growth, especially in the long run. Inflation makes it difficult for economic agents to make correct decisions since changes in relative prices become obscured (Harberger, 1998). Inflation imposes variable costs, especially menu costs. If inflation is high, the variability of inflation may also be high and this complicates the task of forecasting inflation. If inflation cannot be correctly anticipated, both savers and investors may be lead to make decisions that are detrimental to economic growth. This view is traditional and, in spite of the Keynesian views promulgated in the 1960's and thereafter, this view is incorporated into models of the new-growth literature (Bruno & Easterly, 1996).

The empirical evidence regarding the inflation-growth relation is mixed. Fischer (1993) found that real GDP growth is negatively related to inflation in cross sectional regressions and that low inflation is not necessary for growth. Using extreme bounds analysis, Levine and Zervos (1993) found that there is not a significant negative correlation between growth and inflation. They suggest that if inflation persists over a long time period, economic agents find mechanisms to adjust so that growth is not affected. However, cross-country regressions involving socio-economic variables often produce fragile results (Levine & Renelt, 1992).

Grier and Tullock (1989) found that the average level of inflation had a neutral effect on growth in the OECD countries but for the remainder of the world, inflation had a significant negative effect on growth. For Latin America, they found no statistical relation between inflation and growth. Barro (1997), in a world wide cross sectional analysis, found a negative relation between inflation and growth, though the effect could not be isolated for inflation rates below 20 percent. Other research by Barro (1996) indicates that the experiences of high inflation have adverse effects on investment and growth. Kocherlakota (1996) supports Barro's findings of a negative slope coefficient between growth and inflation and further shows that high growth tends to generate low inflation.

Until the 1970's, many studies found the negative effect of inflation on economic growth to be statistically insignificant, and in some instances, the effect was found to be positive (Sarel, 1996). The high and persistent inflation rates experienced by some countries during the 1970's and 1980's brought about a rethinking of the inflation-growth link.

The preceding review of cross-sectional studies, while not exhaustive, does not provide clear evidence of the growth-inflation relation. There are numerous problems associated with the use of cross-country regression analysis. Levine and Renalt (1992) and Temple (1999) review some of the methodological problems. Pooled cross-country data sets tend not to be informative regarding what happens in the lower ranges of inflation (Bruno & Easterly, 1998). The empirical relation between growth and inflation appears to be different for Africa and Latin America (Ericsson, Irons & Tryon, 2001).

Time series analysis, which does have the advantage of unmasking relations for individual countries, has yet to provide evidence of a universal relation between growth and inflation. Paul, Kearney, and Chowdhury (1997) performed Granger causality tests on 70 countries for the

1960-1989 time period. For 40 percent of the countries, no causality was found; for approximately one-third of the countries, unidirectional causality was found; and for approximately one-fifth of the countries, bidirectional causality was found. In 19 of the countries, the direction of causality ran from growth to inflation, while the direction ran from inflation to growth for seven countries.

In this analysis, the correlation between the growth and inflation rates for each of the 17 Latin American countries is examined. Then the data are subjected to Granger causality tests in order to determine if long run relations exist and to determine the direction of causality. The data cover the 40-year period from 1961 through 2000.

DATA

Annual data used for the 17 Latin American countries were extracted from the World Bank's World Development Indicators: 2002 (cd-rom version). Annual inflation rates reflect annual percent changes in the CPI. Changes in the CPI are used in place of the GDP deflator since, by construction, the GDP deflators are negatively correlated with growth rates (Sarel, 1996). For this study, economic growth rates are defined as annual percent changes in real GDP. The countries included in the study are those Latin American countries for which 40 years of annual CPI and GDP growth rates could be obtained.

As a first step in analyzing the growth-inflation relation, the simple correlation coefficients between the annual percentage increases in the real GDP growth rate and the CPI were examined for the each country, and those correlation coefficients appear in Table 1. Only two countries, Paraguay and Uruguay, have positive coefficients, and in both cases, the resulting p-values are extremely large. Only two of the countries, Costa Rica and Mexico, had reasonably high coefficients, and in both instances, the level of significance is quite high.

Table 1: Growth-Inflation Correlations, By Country, 1961-2000

Country	Correlation Coefficient	p-value
Argentina	-0.40	0.01
Bolivia	-0.21	0.19
Columbia	-0.18	0.27
Costa Rica	-0.69	0.00
Dominican Republic	-0.26	0.11
El Salvador	-0.36	0.02
Guatemala	-0.21	0.20

Table 1: Growth-Inflation Correlations, By Country, 1961-2000		
Country	Correlation Coefficient	p-value
Haiti	-0.18	0.26
Honduras	-0.30	0.06
Jamaica	-0.19	0.24
Mexico	-0.60	0.00
Panama	-0.08	0.63
Paraguay	0.13	0.41
Peru	-0.45	0.00
Trinidad & Tobago	-0.00	0.98
Uruguay	0.15	0.35
Venezuela	-0.26	0.10

Table 2 shows the mean growth and inflation rates for the 17 countries. These rates are the simple arithmetic average rates for the 40-year time period. Only three of the 17 countries had average growth rates below two percent, and seven countries had average growth rates in excess of four percent.

Table 2: Mean Growth And Inflation Rates		
Country	Mean Growth Rate	Mean Inflation Rate
Argentina	2.59	242.90
Bolivia	2.74	353.78
Columbia	4.23	19.25
Costa Rica	4.87	14.18
Dominican Republic	5.43	11.95
El Salvador	3.10	9.78
Guatemala	4.05	9.22
Haiti	.95	10.32
Honduras	3.99	8.57
Jamaica	1.95	16.16

Table 2: Mean Growth And Inflation Rates		
Country	Mean Growth Rate	Mean Inflation Rate
Mexico	4.72	26.83
Panama	4.54	2.85
Paraguay	4.52	13.09
Peru	3.14	331.25
Trinidad & Tobago	3.75	8.18
Uruguay	1.93	53.12
Venezuela	2.72	17.01

Three of the countries (Argentina, Bolivia, and Peru) had triple-digit average inflation rates. Argentina experienced triple-digit inflation in 15 of the 40 study years. Bolivia only had that experience for three of the 40 years, but in one year the inflation rate was in the 5-digit range. Panama had the lowest average inflation rate, but its economy has been dollarized for quite some time.

The correlation coefficients indicate that, for 15 of the 17 countries, a possible negative relation exists between growth and inflation, while a positive relation could exist for two of the countries. However, the preceding correlation analysis indicates nothing about the direction of causality. Furthermore, well-known difficulties with time series analysis may be present. If the data are nonstationary, then the results found may be spurious (Murray, 1994).

METHODOLOGY

In order to gain insight into the direction of causality between inflation and growth, two causality techniques will be used. While no statistical test can indicate true causality, inference can be made as to which variable may precede another variable.

The first technique is the test for Granger causality (Granger, 1969). With Granger causality, to determine if growth (Y) "Granger causes" inflation (P), the following two regression equations are estimated:

$$P_t = \alpha + \sum_{i=1}^{m} \beta_i P_{t-i} + e_t \qquad (1)$$

$$P_t = \alpha + \sum_{i=1}^{m} \phi_i P_{t-i} + \sum_{i=1}^{n} \delta_i Y_{t-i} + u_t \qquad (2)$$

The first equation is the current inflation values regressed on lagged values of inflation. The second equation adds lagged values of growth to determine if past values of growth assist in the prediction of current values of inflation. An F-test is then used to determine whether the coefficients of the lagged growth rates in the second equation may be considered to be zero. To test for causation from inflation to growth, the test is repeated where growth is regressed on past values of growth and then compared to the regression of current values of growth regressed on past values of growth and inflation. The direction of causation between growth and inflation can be one of four possibilities: inflation to growth, growth to inflation, bidirectional between growth and inflation, or no relationship between growth and inflation.

The second technique used to investigate the direction of causality is the method used by Paul, Kearney, and Chowdhury (1997). This variation of the Granger causality model allows for "instantaneous causality" by allowing current values of inflation to play a role in determining current values of growth and vice versa. The authors consider this to be advantageous for annual data due to the speed with which information is transmitted through an economy. The model used in this paper differs slightly from the one suggested in Paul, Kearney, and Chowdhury (1997). Paul, et. al., includes the growth rate of money as a possible determinant of inflation. This paper excludes this variable since the focus is on the relationship between inflation and growth only. The following models will be used to further test for causality. For these models, the significance of the coefficients will be used to determine the direction of causality.

$$P_t = \alpha + \sum_{i=1}^{l} \phi_i P_{t-i} + \sum_{i=0}^{p} \gamma Y_{t-i} + v_t \tag{3}$$

$$Y_t = \alpha + \sum_{i=1}^{q} \lambda_i Y_{t-i} + \sum_{i=0}^{r} \eta_i P_{t-i} + z_t \tag{4}$$

RESULTS

Before proceeding with the causality tests, it is important to determine the order of integration of the data. Estimation of the equations requires the use of stationary data. If both growth and inflation rates are nonstationary, cointegration tests are a more appropriate technique to discern long-run relationships and Granger causality. Dickey-Fuller (1979, 1981) and Phillips-Perron (1988) Unit Root tests are two commonly used techniques to determine whether or not time series is stationary. More than one test is typically used due to the low power of the tests. If the tests confirm one another, greater confidence can be placed in the results (Enders, 1995).

Table 3 reports the results of the unit root tests. The lag length was selected using Akaike Information Criterion (AIC). After selecting the lag length, the selection of appropriate model is

addressed. The choice for the models includes a time trend and constant, a constant, or no time trend or constant (none). The power of unit root tests is very sensitive to the deterministic regressors selected. The models were selected using the technique outlined by Doldado, Jenkinson, and Sosvilla-Rivero (1995). The null hypothesis of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test is the time series contains a unit root or integrated of order one. Failure to reject the null means the series is integrated of order one, I(1), or higher while rejecting the null means the series is stationary or integrated of order zero, I(0).

The five-percent MacKinnon Critical Values for both the ADF and PP test statistic for a lag of zero and no constant or time trend is -1.96. Since most of the models fit this description the reader is referred to MacKinnon (1991) for other critical values.

Table 3: Unit Root Test Results For Growth And Inflation Rates

Country	Var.	Lag	Model	ADF	PP	Conclusion
Argentina	Y	0	None	-4.83	-4.83	I(0)
	P	1	None	-3.69	-3.29	I(0)
Bolivia	Y	0	None	-3.34	-3.34	I(0)
	P	0	None	-5.39	-5.39	I(0)
Columbia	Y	0	Constant	-3.65	-3.65	I(0)
	P	0	Constant	-2.75	-2.75	I(1)
Costa Rica	Y	0	Constant	-4.50	-4.50	I(0)
	P	0	Constant	-1.75	-1.75	I(1)
Dominican Republic	Y	0	Constant	-6.14	-6.14	I(0)
	P	0	None	-1.26	-1.26	I(1)
El Salvador	Y	1	None	-2.49	-2.14	I(0)
	P	0	None	-1.20	-1.20	I(1)
Guatemala	Y	0	None	-1.63	-1.63	I(1)
	P	0	None	-2.14	-2.14	I(0)
Haiti	Y	1	None	-3.40	-6.36	I(0)
	P	0	None	-1.76	-1.76	I(1)
Honduras	Y	0	Constant	-4.75	-4.75	I(0)
	P	0	None	-1.14	-1.14	I(1)
Jamaica	Y	1	None	-2.43	-4.01	I(0)
	P	0	None	-0.95	-0.95	I(1)
Mexico	Y	0	Constant	-4.12	-4.12	I(0)
	P	2	None	-1.08	-1.58	I(1)

Table 3: Unit Root Test Results For Growth And Inflation Rates						
Country	Var.	Lag	Model	ADF	PP	Conclusion
Panama	Y	1	Constant	-3.95	-4.13	I(0)
	P	0	None	-1.05	-1.05	I(1)
Paraguay	Y	0	None	-2.12	-2.12	I(0)
	P	0	None	-1.63	-1.63	I(1)
Peru	Y	1	None	-3.43	-3.54	I(0)
	P	0	None	-1.22	-1.22	I(1)
Trinidad & Tobago	Y	1	None	-1.82	-4.06	I(0)
	P	0	None	-1.13	-1.13	I(1)
Uruguay	Y	2	Constant	-4.73	-3.96	I(0)
	P	0	None	-1.31	-1.31	I(1)
Venezuela	Y	0	Constant	-5.53	-5.53	I(0)
	P	4	None	-1.41	-1.82	I(1)

The ADF and PP test gave conflicting results for the growth rate for Trinidad & Tobago. In this case, the order of integration was determined by the PP test. The reason for favoring the PP test is due to the assumptions required for both tests. The ADF test assumes the error terms are independent with a constant variance. The PP test assumes the error terms are weakly dependent and heterogeneously distributed. Due to the nature of the data, the assumptions for the PP test are more reasonable than the ADF test.

For the growth rate variables, sixteen are stationary and one is nonstationary. For the inflation variables, three are stationary and fourteen are nonstationary. When the null hypothesis of a unit root is not rejected, this means the time series could be integrated of order one or higher. For the growth and inflation rates that were found to be nonstationary, these variables were checked for higher orders of integration. While the results are not reported here, it can be concluded that the nonstationary variables are integrated of order one. For the variables having unit roots, the first difference of the variable is used in the estimation of the causality regressions.

Table 4 reports the results of the Granger Causality Tests as discussed in the methodology section. A lag length of two was chosen for the tests. These results should be interpreted with caution due to the nonnormality and/or heteroscedasticity of the error terms. At the ten percent level of significance, it appears the growth precedes inflation in Columbia, Honduras, and Venezuela. Inflation precedes growth in Haiti. There is no detection of bidirectional causality between inflation and growth for any of the countries using this technique. The statistical evidence indicates that for the majority of the countries (Argentina, Bolivia, Costa Rica, Dominican Republic, El Salvador,

Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay) there is no causal relationship between growth and inflation.

Table 4: Results Of Granger-Causality Test

Country	Ho: Inflation does not Cause Inflation		Ho: Growth does not Cause Inflation	
	F-Value	p-Value	F-Value	p-Value
Argentina	2.39	0.11	0.17	0.85
Bolivia	0.69	0.51	2.11	0.14
Columbia	0.52	0.60	4.53	0.02
Costa Rica	1.01	0.38	0.96	0.39
Dominican Republic	0.04	0.96	0.99	0.38
El Salvador	0.95	0.40	0.06	0.94
Guatemala	0.44	0.65	0.73	0.49
Haiti	2.69	0.08	0.10	0.91
Honduras	1.28	0.29	2.49	0.10
Jamaica	1.12	0.34	0.52	0.60
Mexico	0.34	0.71	0.63	0.54
Panama	1.30	0.29	0.85	0.44
Paraguay	1.40	0.26	0.54	0.59
Peru	0.63	0.54	2.09	0.14
Trinidad & Tobago	2.24	0.12	0.32	0.73
Uruguay	1.15	0.33	2.26	0.12
Venezuela	1.27	0.29	4.80	0.02

Table 5 reports the results of the Paul, Kearney, and Chowdhury (1997) alternative variation of the Granger causality test. This model allows for instantaneous causality between growth and inflation. The previous model only allowed for a lagged relationship. To expedite the reporting of the results, only the countries where a statistically significant relationship is evidenced will be given in Table 5. The table reports the regression coefficients and the p-values. As stated before, these results should be interpreted with caution due to the violation of assumptions concerning the error term. Where applicable, the regression results have been corrected for heteroscedasitcity.

Table 5: Alternative Granger Causality Test							
Inflation Model (Equation 3)							
Country	α	P_{t-1}	P_{t-2}	Y_t	Y_{t-1}	Y_{t-2}	Adj R^2
Argentina	343.61	0.546	-0.197	-42.307	-7.579	-16.883	0.41
	(0.01)	(0.00)	(0.26)	(0.01)	(0.64)	(0.30)	
Costa Rica	2.716	-0.243	-0.086	-2.578	0.967	1.086	0.33
	(0.73)	(0.18)	(0.68)	(0.10)	(0.14)	(0.22)	
Honduras	-3.044	0.045	-0.112	-0.611	0.748	0.490	0.12
	(0.27)	(0.83)	(0.59)	(0.15)	(0.09)	(0.28)	
Mexico	1.099	0.083	-0.323	-2.317	0.892	1.236	0.26
	(0.88)	(0.67)	(0.34)	(0.00)	(0.45)	(0.20)	
Venezuela	-6.702	0.412	0.476	-2.543	3.438	0.317	0.33
	(0.20)	(0.12)	(0.07)	(0.00)	(0.00)	(0.76)	
Growth Model (Equation 4)							
Country	α	Y_{t-1}	Y_{t-2}	P_t	P_{t-1}	P_{t-2}	Adj R^2
Argentina	3.926	-0.049	-0.256	-0.004	0.000	0.002	0.26
	(0.00)	(0.77)	(0.12)	(0.01)	(0.89)	(0.20)	
Costa Rica	2.361	0.410	0.111	-0.125	-0.052	0.021	0.39
	(0.03)	(0.04)	(0.54)	(0.00)	(0.19)	(0.55)	
Haiti	0.786	0.093	0.130	-0.034	0.025	-0.178	0.05
	(0.29)	(0.57)	(0.41)	(0.68)	(0.78)	(0.05)	
Venezuela	0.894	0.409	0.072	-0.086	0.081	0.090	0.17
	(0.36)	(0.05)	(0.71)	(0.01)	(0.10)	(0.06)	
Note: Parameter estimates with p-values in parenthesis.							

Using this alternative model, growth "causes" inflation in Honduras and Mexico. Inflation "causes" growth in Haiti. There is a bidirectional relationship for Argentina, Costa Rica, and Venezuela. There was no relationship between growth and inflation for Bolivia, Columbia, Dominican Republic, El Salvador, Guatemala, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay. Table 6 provides a summary of the results of both causality tests. As might be expected, more relationships are detected between inflation and growth rates when instantaneous causality is included in the model.

Table 6: Summary Of Results			
Granger Causality Test			
Y⇒P	P ⇒Y	Y⇔ P	No Causality
Columbia	Haiti	None	Argentina
Honduras			Bolivia
Venezuela			Costa Rica
			Dominican Republic
			El Salvador
			Guatemala
			Jamaica
			Mexico
			Panama
			Paraguay
			Peru
			Trinidad & Tobago
			Uruguay
Alternative Test for Granger Causality			
Y⇒ P	P ⇒ Y	Y ⇔ P	No Causality
Honduras	Haiti	Argentina	Bolivia
Mexico		Costa Rica	Columbia
		Venezuela	Dominican Republic
			El Salvador
			Guatemala
			Jamaica
			Panama
			Paraguay
			Peru
			Trinidad & Tobago
			Uruguay

CONCLUSION

This study has explored the possible relationship between real GDP growth and the rate of inflation, as measured through the GDP deflator, in Latin America over the period of 1961 to 2000. In addition to correlation analysis, Granger causality is used to investigate the nature of the relationship between growth and inflation rates.

The correlation analysis revealed mixed results. For countries where the correlation coefficient is statistically significant, the relationship between growth and the rate of inflation is negative. However there are two possible problems with this analysis. First, the correlation analysis does not indicate the causal flow of the relationship. Is growth having a negative impact on inflation or vice versa? Second, this analysis may yield spurious results if the data is nonstationary.

Unit root analysis is conducted prior to the estimating the Granger causality models. In the cases where the variable is determined to be nonstationary, the variable is first differenced prior to the estimation of the Granger causality models. Two forms of Granger causality tests are conducted. The interpretation of these results should be treated with caution since, due to the nature of the data, the regression models tend to experience violation of the assumptions about the error terms.

For the seventeen countries under study, there was no statistical evidence of a relationship between growth and inflation in eleven countries (Bolivia, Columbia, Dominican Republic, El Salvador, Guatemala, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay) using the Paul, Kearney and Chowdhury (1997) variation of the Granger causality test. In these countries, economic growth and inflation are not statistically linked. In Haiti where inflation tends to "cause" growth, the preponderance of the evidence indicate an adverse relationship between inflation and growth. For this country, increases in inflation may lead to decreased economic growth. In Honduras and Mexico where growth "causes" inflation, the negative relationship is more beneficial for the economy. For these countries, as the economy experiences positive growth, this tends to decrease inflation. Argentina, Costa Rica, and Venezuela have more complicated relationships between inflation and growth. Growth and inflation appear to have bidirectional causality.

For the Latin American countries used in Paul, Kearney, and Chowdhury (1997), fifteen (Bolivia, Columbia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, Uruguay, and Venezuela) of the countries are also used in this study. For these fifteen countries, the same general conclusion was reached about causality for Costa Rica ($Y \Leftrightarrow P$) and Honduras ($Y \Rightarrow P$). Also, both studies conclude that there is no statistical evidence of causality between growth and inflation for El Salvador, Guatemala, Jamaica, Paraguay, Trinidad & Tobago, and Uruguay. While this study differs in the model (see endnote 1) and the time period used, the studies reach similar conclusions for eight of the fifteen countries. However, the fragility of the results of statistical analysis indicates a need for continual analysis and model development.

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THE RELATION BETWEEN GROWTH AND INFLATION RATES IN LATIN AMERICA

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ABSTRACT

Inflation has long been a problem for countries in Latin America. While some countries have made progress in addressing the problem, other countries have not been able to achieve sustained economic growth. Keynesian thought posits the notion that inflation and growth can be positively related, while other theories suggest that inflation is detrimental to long-run growth. Various empirical studies yield conflicting results. This study applies two Granger causality tests to seventeen Latin American countries in order to determine possible long-run relations. For most of the countries, no causality is found, while unidirectional causality and bi-directional causality is found in a limited number of countries.

INTRODUCTION

Historically, many Latin American countries have been plagued by inflation problems though the problem has not been universally severe. During the past few decades, some of the countries have made considerable progress toward controlling inflation while others still struggle in the battle against inflation. Some countries in the region have also encountered difficulties in maintaining respectable economic growth rates. The purpose of this paper is to explore the relations that appear to exist between inflation and economic growth in selected Latin American countries and to note some of the econometric problems that exist in analyses of this nature.

There is far from universal agreement regarding the relation between inflation and economic growth, and this relation has long held a central position in macroeconomics. The traditional Keynesian view would hold that inflation can act as a stimulus to economic growth. This view is typically expressed through a short run Phillips curve tradeoff (Paul, Kearney & Chowdhury, 1997) that arises due to sticky prices and wages. Thus, in the short run, faster real growth may be associated with inflation (Motley, 1998). However, the Phillips curve tradeoff tends to disappear as economic agents are able to anticipate price changes. These views were especially prominent in the 1960's and continued into the 1980's (Bruno & Easterly, 1996).

There are strong arguments that inflation is detrimental to economic growth, especially in the long run. Inflation makes it difficult for economic agents to make correct decisions since

changes in relative prices become obscured (Harberger, 1998). Inflation imposes variable costs, especially menu costs. If inflation is high, the variability of inflation may also be high and this complicates the task of forecasting inflation. If inflation cannot be correctly anticipated, both savers and investors may be lead to make decisions that are detrimental to economic growth. This view is traditional and, in spite of the Keynesian views promulgated in the 1960's and thereafter, this view is incorporated into models of the new-growth literature (Bruno & Easterly, 1996).

The empirical evidence regarding the inflation-growth relation is mixed. Fischer (1993) found that real GDP growth is negatively related to inflation in cross sectional regressions and that low inflation is not necessary for growth. Using extreme bounds analysis, Levine and Zervos (1993) found that there is not a significant negative correlation between growth and inflation. They suggest that if inflation persists over a long time period, economic agents find mechanisms to adjust so that growth is not affected. However, cross-country regressions involving socio-economic variables often produce fragile results (Levine & Renelt, 1992).

Grier and Tullock (1989) found that the average level of inflation had a neutral effect on growth in the OECD countries but for the remainder of the world, inflation had a significant negative effect on growth. For Latin America, they found no statistical relation between inflation and growth. Barro (1997), in a world wide cross sectional analysis, found a negative relation between inflation and growth, though the effect could not be isolated for inflation rates below 20 percent. Other research by Barro (1996) indicates that the experiences of high inflation have adverse effects on investment and growth. Kocherlakota (1996) supports Barro's findings of a negative slope coefficient between growth and inflation and further shows that high growth tends to generate low inflation.

Until the 1970's, many studies found the negative effect of inflation on economic growth to be statistically insignificant, and in some instances, the effect was found to be positive (Sarel, 1996). The high and persistent inflation rates experienced by some countries during the 1970's and 1980's brought about a rethinking of the inflation-growth link.

The preceding review of cross-sectional studies, while not exhaustive, does not provide clear evidence of the growth-inflation relation. There are numerous problems associated with the use of cross-country regression analysis. Levine and Renalt (1992) and Temple (1999) review some of the methodological problems. Pooled cross-country data sets tend not to be informative regarding what happens in the lower ranges of inflation (Bruno & Easterly, 1998). The empirical relation between growth and inflation appears to be different for Africa and Latin America (Ericsson, Irons & Tryon, 2001).

Time series analysis, which does have the advantage of unmasking relations for individual countries, has yet to provide evidence of a universal relation between growth and inflation. Paul, Kearney, and Chowdhury (1997) performed Granger causality tests on 70 countries for the 1960-1989 time period. For 40 percent of the countries, no causality was found; for approximately one-third of the countries, unidirectional causality was found; and for approximately one-fifth of the

countries, bidirectional causality was found. In 19 of the countries, the direction of causality ran from growth to inflation, while the direction ran from inflation to growth for seven countries.

In this analysis, the correlation between the growth and inflation rates for each of the 17 Latin American countries is examined. Then the data are subjected to Granger causality tests in order to determine if long run relations exist and to determine the direction of causality. The data cover the 40-year period from 1961 through 2000.

DATA

Annual data used for the 17 Latin American countries were extracted from the World Bank's World Development Indicators: 2002 (cd-rom version). Annual inflation rates reflect annual percent changes in the CPI. Changes in the CPI are used in place of the GDP deflator since, by construction, the GDP deflators are negatively correlated with growth rates (Sarel, 1996). For this study, economic growth rates are defined as annual percent changes in real GDP. The countries included in the study are those Latin American countries for which 40 years of annual CPI and GDP growth rates could be obtained.

As a first step in analyzing the growth-inflation relation, the simple correlation coefficients between the annual percentage increases in the real GDP growth rate and the CPI were examined for the each country, and those correlation coefficients appear in Table 1. Only two countries, Paraguay and Uruguay, have positive coefficients, and in both cases, the resulting p-values are extremely large. Only two of the countries, Costa Rica and Mexico, had reasonably high coefficients, and in both instances, the level of significance is quite high.

Table 1: Growth-Inflation Correlations, By Country, 1961-2000

Country	Correlation Coefficient	p-value
Argentina	-0.40	0.01
Bolivia	-0.21	0.19
Columbia	-0.18	0.27
Costa Rica	-0.69	0.00
Dominican Republic	-0.26	0.11
El Salvador	-0.36	0.02
Guatemala	-0.21	0.20
Haiti	-0.18	0.26
Honduras	-0.30	0.06

Table 1: Growth-Inflation Correlations, By Country, 1961-2000		
Country	Correlation Coefficient	p-value
Jamaica	-0.19	0.24
Mexico	-0.60	0.00
Panama	-0.08	0.63
Paraguay	0.13	0.41
Peru	-0.45	0.00
Trinidad & Tobago	-0.00	0.98
Uruguay	0.15	0.35
Venezuela	-0.26	0.10

Table 2 shows the mean growth and inflation rates for the 17 countries. These rates are the simple arithmetic average rates for the 40-year time period. Only three of the 17 countries had average growth rates below2%, and seven countries had average growth rates in excess of 4%.

Table 2: Mean Growth And Inflation Rates		
Country	Mean Growth Rate	Mean Inflation Rate
Argentina	2.59	242.90
Bolivia	2.74	353.78
Columbia	4.23	19.25
Costa Rica	4.87	14.18
Dominican Republic	5.43	11.95
El Salvador	3.10	9.78
Guatemala	4.05	9.22
Haiti	.95	10.32
Honduras	3.99	8.57
Jamaica	1.95	16.16
Mexico	4.72	26.83
Panama	4.54	2.85
Paraguay	4.52	13.09
Peru	3.14	331.25
Trinidad & Tobago	3.75	8.18

Uruguay	1.93	53.12
Venezuela	2.72	17.01

Three of the countries (Argentina, Bolivia, and Peru) had triple-digit average inflation rates. Argentina experienced triple-digit inflation in 15 of the 40 study years. Bolivia only had that experience for three of the 40 years, but in one year the inflation rate was in the 5-digit range. Panama had the lowest average inflation rate, but its economy has been dollarized for quite some time.

The correlation coefficients indicate that, for 15 of the 17 countries, a possible negative relation exists between growth and inflation, while a positive relation could exist for two of the countries. However, the preceding correlation analysis indicates nothing about the direction of causality. Furthermore, well-known difficulties with time series analysis may be present. If the data are nonstationary, then the results found may be spurious (Murray, 1994).

METHODOLOGY

In order to gain insight into the direction of causality between inflation and growth, two causality techniques will be used. While no statistical test can indicate true causality, inference can be made as to which variable may precede another variable.

The first technique is the test for Granger causality (Granger, 1969). With Granger causality, to determine if growth (Y) "Granger causes" inflation (P), the following two regression equations are estimated:

$$P_t = \alpha + \sum_{i=1}^{m} \beta_i P_{t-i} + e_t \qquad (1)$$

$$P_t = \alpha + \sum_{i=1}^{m} \phi_i P_{t-i} + \sum_{i=1}^{n} \delta_i Y_{t-i} + u_t \qquad (2)$$

The first equation is the current inflation values regressed on lagged values of inflation. The second equation adds lagged values of growth to determine if past values of growth assist in the prediction of current values of inflation. An F-test is then used to determine whether the coefficients of the lagged growth rates in the second equation may be considered to be zero. To test for causation from inflation to growth, the test is repeated where growth is regressed on past values of growth and then compared to the regression of current values of growth regressed on past values of growth and inflation. The direction of causation between growth and inflation can be one of four

possibilities: inflation to growth, growth to inflation, bidirectional between growth and inflation, or no relationship between growth and inflation.

The second technique used to investigate the direction of causality is the method used by Paul, Kearney, and Chowdhury (1997). This variation of the Granger causality model allows for "instantaneous causality" by allowing current values of inflation to play a role in determining current values of growth and vice versa. The authors consider this to be advantageous for annual data due to the speed with which information is transmitted through an economy. The model used in this paper differs slightly from the one suggested in Paul, Kearney, and Chowdhury (1997). Paul, et. al., includes the growth rate of money as a possible determinant of inflation. This paper excludes this variable since the focus is on the relationship between inflation and growth only. The following models will be used to further test for causality. For these models, the significance of the coefficients will be used to determine the direction of causality.

$$P_t = \alpha + \sum_{i=1}^{l} \phi_i P_{t-i} + \sum_{i=0}^{p} \gamma_i Y_{t-i} + v_t \tag{3}$$

$$Y_t = \alpha + \sum_{i=1}^{q} \lambda_i Y_{t-i} + \sum_{i=0}^{r} \eta_i P_{t-i} + z_t \tag{4}$$

RESULTS

Before proceeding with the causality tests, it is important to determine the order of integration of the data. Estimation of the equations requires the use of stationary data. If both growth and inflation rates are nonstationary, cointegration tests are a more appropriate technique to discern long-run relationships and Granger causality. Dickey-Fuller (1979, 1981) and Phillips-Perron (1988) Unit Root tests are two commonly used techniques to determine whether or not time series is stationary. More than one test is typically used due to the low power of the tests. If the tests confirm one another, greater confidence can be placed in the results (Enders, 1995).

Table 3 reports the results of the unit root tests. The lag length was selected using Akaike Information Criterion (AIC). After selecting the lag length, the selection of appropriate model is addressed. The choice for the models includes a time trend and constant, a constant, or no time trend or constant (none). The power of unit root tests is very sensitive to the deterministic regressors selected. The models were selected using the technique outlined by Doldado, Jenkinson, and Sosvilla-Rivero (1995). The null hypothesis of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test is the time series contains a unit root or integrated of order one. Failure to reject the null means the series is integrated of order one, I(1), or higher while rejecting the null means the series is stationary or integrated of order zero, I(0).

The five-percent MacKinnon Critical Values for both the ADF and PP test statistic for a lag of zero and no constant or time trend is -1.96. Since most of the models fit this description the reader is referred to MacKinnon (1991) for other critical values.

The ADF and PP test gave conflicting results for the growth rate for Trinidad & Tobago. In this case, the order of integration was determined by the PP test. The reason for favoring the PP test is due to the assumptions required for both tests. The ADF test assumes the error terms are independent with a constant variance. The PP test assumes the error terms are weakly dependent and heterogeneously distributed. Due to the nature of the data, the assumptions for the PP test are more reasonable than the ADF test.

Table 3: Unit Root Test Results For Growth And Inflation Rates

Country	Var.	Lag	Model	ADF	PP	Conclusion
Argentina	Y	0	None	-4.83	-4.83	I(0)
	P	1	None	-3.69	-3.29	I(0)
Bolivia	Y	0	None	-3.34	-3.34	I(0)
	P	0	None	-5.39	-5.39	I(0)
Columbia	Y	0	Constant	-3.65	-3.65	I(0)
	P	0	Constant	-2.75	-2.75	I(1)
Costa Rica	Y	0	Constant	-4.50	-4.50	I(0)
	P	0	Constant	-1.75	-1.75	I(1)
Dominican Republic	Y	0	Constant	-6.14	-6.14	I(0)
	P	0	None	-1.26	-1.26	I(1)
El Salvador	Y	1	None	-2.49	-2.14	I(0)
	P	0	None	-1.20	-1.20	I(1)
Guatemala	Y	0	None	-1.63	-1.63	I(1)
	P	0	None	-2.14	-2.14	I(0)
Haiti	Y	1	None	-3.40	-6.36	I(0)
	P	0	None	-1.76	-1.76	I(1)
Honduras	Y	0	Constant	-4.75	-4.75	I(0)
	P	0	None	-1.14	-1.14	I(1)
Jamaica	Y	1	None	-2.43	-4.01	I(0)
	P	0	None	-0.95	-0.95	I(1)
Mexico	Y	0	Constant	-4.12	-4.12	I(0)
	P	2	None	-1.08	-1.58	I(1)

Table 3: Unit Root Test Results For Growth And Inflation Rates

Country	Var.	Lag	Model	ADF	PP	Conclusion
Panama	Y	1	Constant	-3.95	-4.13	I(0)
	P	0	None	-1.05	-1.05	I(1)
Paraguay	Y	0	None	-2.12	-2.12	I(0)
	P	0	None	-1.63	-1.63	I(1)
Peru	Y	1	None	-3.43	-3.54	I(0)
	P	0	None	-1.22	-1.22	I(1)
Trinidad & Tobago	Y	1	None	-1.82	-4.06	I(0)
	P	0	None	-1.13	-1.13	I(1)
Uruguay	Y	2	Constant	-4.73	-3.96	I(0)
	P	0	None	-1.31	-1.31	I(1)
Venezuela	Y	0	Constant	-5.53	-5.53	I(0)
	P	4	None	-1.41	-1.82	I(1)

For the growth rate variables, sixteen are stationary and one is nonstationary. For the inflation variables, three are stationary and fourteen are nonstationary. When the null hypothesis of a unit root is not rejected, this means the time series could be integrated of order one or higher. For the growth and inflation rates that were found to be nonstationary, these variables were checked for higher orders of integration. While the results are not reported here, it can be concluded that the nonstationary variables are integrated of order one. For the variables having unit roots, the first difference of the variable is used in the estimation of the causality regressions.

Table 4 reports the results of the Granger Causality Tests as discussed in the methodology section. A lag length of two was chosen for the tests. These results should be interpreted with caution due to the nonnormality and/or heteroscedasticity of the error terms. At the ten percent level of significance, it appears the growth precedes inflation in Columbia, Honduras, and Venezuela. Inflation precedes growth in Haiti. There is no detection of bidirectional causality between inflation and growth for any of the countries using this technique. The statistical evidence indicates that for the majority of the countries (Argentina, Bolivia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay) there is no causal relationship between growth and inflation.

Table 4: Results Of Granger-Causality Test				
Country	Ho: Inflation does not Cause Inflation		Ho: Growth does not Cause Inflation	
	F-Value	p-Value	F-Value	p-Value
Argentina	2.39	0.11	0.17	0.85
Bolivia	0.69	0.51	2.11	0.14
Columbia	0.52	0.60	4.53	0.02
Costa Rica	1.01	0.38	0.96	0.39
Dominican Republic	0.04	0.96	0.99	0.38
El Salvador	0.95	0.40	0.06	0.94
Guatemala	0.44	0.65	0.73	0.49
Haiti	2.69	0.08	0.10	0.91
Honduras	1.28	0.29	2.49	0.10
Jamaica	1.12	0.34	0.52	0.60
Mexico	0.34	0.71	0.63	0.54
Panama	1.30	0.29	0.85	0.44
Paraguay	1.40	0.26	0.54	0.59
Peru	0.63	0.54	2.09	0.14
Trinidad & Tobago	2.24	0.12	0.32	0.73
Uruguay	1.15	0.33	2.26	0.12
Venezuela	1.27	0.29	4.80	0.02

Table 5 reports the results of the Paul, Kearney, and Chowdhury (1997) alternative variation of the Granger causality test. This model allows for instantaneous causality between growth and inflation. The previous model only allowed for a lagged relationship. To expedite the reporting of the results, only the countries where a statistically significant relationship is evidenced will be given in Table 5. The table reports the regression coefficients and the p-values. As stated before, these results should be interpreted with caution due to the violation of assumptions concerning the error term. Where applicable, the regression results have been corrected for heteroscedasitcity.

Using this alternative model, growth "causes" inflation in Honduras and Mexico. Inflation "causes" growth in Haiti. There is a bidirectional relationship for Argentina, Costa Rica, and Venezuela. There was no relationship between growth and inflation for Bolivia, Columbia, Dominican Republic, El Salvador, Guatemala, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay. Table 6 provides a summary of the results of both causality tests. As might

be expected, more relationships are detected between inflation and growth rates when instantaneous causality is included in the model.

Table 5: Alternative Granger Causality Test

Inflation Model (Equation 3)

Country	α	P_{t-1}	P_{t-2}	Y_t	Y_{t-1}	Y_{t-2}	Adj R^2
Argentina	343.61	0.546	-0.197	-42.307	-7.579	-16.883	0.41
	(0.01)	(0.00)	(0.26)	(0.01)	(0.64)	(0.30)	
Costa Rica	2.716	-0.243	-0.086	-2.578	0.967	1.086	0.33
	(0.73)	(0.18)	(0.68)	(0.10)	(0.14)	(0.22)	
Honduras	-3.044	0.045	-0.112	-0.611	0.748	0.490	0.12
	(0.27)	(0.83)	(0.59)	(0.15)	(0.09)	(0.28)	
Mexico	1.099	0.083	-0.323	-2.317	0.892	1.236	0.26
	(0.88)	(0.67)	(0.34)	(0.00)	(0.45)	(0.20)	
Venezuela	-6.702	0.412	0.476	-2.543	3.438	0.317	0.33
	(0.20)	(0.12)	(0.07)	(0.00)	(0.00)	(0.76)	

Growth Model (Equation 4)

Country	α	Y_{t-1}	Y_{t-2}	P_t	P_{t-1}	P_{t-2}	Adj R^2
Argentina	3.926	-0.049	-0.256	-0.004	0.000	0.002	0.26
	(0.00)	(0.77)	(0.12)	(0.01)	(0.89)	(0.20)	
Costa Rica	2.361	0.410	0.111	-0.125	-0.052	0.021	0.39
	(0.03)	(0.04)	(0.54)	(0.00)	(0.19)	(0.55)	
Haiti	0.786	0.093	0.130	-0.034	0.025	-0.178	0.05
	(0.29)	(0.57)	(0.41)	(0.68)	(0.78)	(0.05)	
Venezuela	0.894	0.409	0.072	-0.086	0.081	0.090	0.17
	(0.36)	(0.05)	(0.71)	(0.01)	(0.10)	(0.06)	

Note: Parameter estimates with p-values in parenthesis.

Table 6: Summary Of Results			
Granger Causality Test			
Y⇒P	P ⇒Y	Y⇔ P	No Causality
Columbia	Haiti	None	Argentina
Honduras			Bolivia
Venezuela			Costa Rica
			Dominican Republic
			El Salvador
			Guatemala
			Jamaica
			Mexico
			Panama
			Paraguay
			Peru
			Trinidad & Tobago
			Uruguay
Alternative Test for Granger Causality			
Y⇒ P	P ⇒ Y	Y ⇔ P	No Causality
Honduras	Haiti	Argentina	Bolivia
Mexico		Costa Rica	Columbia
		Venezuela	Dominican Republic
			El Salvador
			Guatemala
			Jamaica
			Panama
			Paraguay
			Peru
			Trinidad & Tobago
			Uruguay

CONCLUSION

This study has explored the possible relationship between real GDP growth and the rate of inflation, as measured through the GDP deflator, in Latin America over the period of 1961 to 2000. In addition to correlation analysis, Granger causality is used to investigate the nature of the relationship between growth and inflation rates.

The correlation analysis revealed mixed results. For countries where the correlation coefficient is statistically significant, the relationship between growth and the rate of inflation is negative. However there are two possible problems with this analysis. First, the correlation analysis does not indicate the causal flow of the relationship. Is growth having a negative impact on inflation or vice versa? Second, this analysis may yield spurious results if the data is nonstationary.

Unit root analysis is conducted prior to the estimating the Granger causality models. In the cases where the variable is determined to be nonstationary, the variable is first differenced prior to the estimation of the Granger causality models. Two forms of Granger causality tests are conducted. The interpretation of these results should be treated with caution since, due to the nature of the data, the regression models tend to experience violation of the assumptions about the error terms.

For the seventeen countries under study, there was no statistical evidence of a relationship between growth and inflation in eleven countries (Bolivia, Columbia, Dominican Republic, El Salvador, Guatemala, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay) using the Paul, Kearney and Chowdhury (1997) variation of the Granger causality test. In these countries, economic growth and inflation are not statistically linked. In Haiti where inflation tends to "cause" growth, the preponderance of the evidence indicate an adverse relationship between inflation and growth. For this country, increases in inflation may lead to decreased economic growth. In Honduras and Mexico where growth "causes" inflation, the negative relationship is more beneficial for the economy. For these countries, as the economy experiences positive growth, this tends to decrease inflation. Argentina, Costa Rica, and Venezuela have more complicated relationships between inflation and growth. Growth and inflation appear to have bidirectional causality.

For the Latin American countries used in Paul, Kearney, and Chowdhury (1997), fifteen (Bolivia, Columbia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, Uruguay, and Venezuela) of the countries are also used in this study. For these fifteen countries, the same general conclusion was reached about causality for Costa Rica ($Y \Leftrightarrow P$) and Honduras ($Y \Rightarrow P$). Also, both studies conclude that there is no statistical evidence of causality between growth and inflation for El Salvador, Guatemala, Jamaica, Paraguay, Trinidad & Tobago, and Uruguay. While this study differs in the model (see endnote 1) and the time period used, the studies reach similar conclusions for eight of the fifteen countries. However, the fragility of the results of statistical analysis indicates a need for continual analysis and model development.

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A COMPARISON OF THE RISK AND RETURN CHARACTERISTICS OF DEVELOPED AND EMERGING STOCK MARKETS

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ABSTRACT

Finance theory suggests that the higher volatility typically associated with emerging stock market returns translates into higher expected returns in those markets. This paper compares the risk and return profile of emerging and developed stock markets over the period from 1994 through 2001. Specifically, this study investigates, from a U.S. investor's point of view, whether a measurable difference in risk characteristics exists between the two markets and whether the realized rates of return in these two types of markets reflect these risk characteristics. The results show that the risk associated with emerging markets, as measured by the volatility of returns, is notably higher than the risk in developed markets in most periods. However, the returns in emerging markets have been notably lower than those in developed markets for most of the time frames examined. The findings suggest that risk-averse investors seeking higher returns in volatile emerging markets have not been well-compensated for assuming the higher risk associated with these markets.

INTRODUCTION

The literature makes a distinction between developed and emerging stock markets based on their differing characteristics. The world's developed stock markets are generally assumed to be more liquid and efficient compared to their counterparts in emerging countries. Finance theory suggests that the higher volatility typically associated with emerging stock market returns translates into higher expected returns in those markets. While many stock markets underwent considerable evolution during the last decade, emerging markets, in particular, grew exponentionally in terms of trading volume, number of listed companies, and market capitalization (Goetzmann & Jorion, 1999). In recent years, attractive prospects in these markets have renewed the interest of global investors (Domowitz et al., 1997; Richards, 1996; Erb et al., 1997; Bekaert et al., 1997). Although there is some evidence to suggest that many emerging markets are becoming more integrated into the global

capital market (Bekaert & Harvey, 1995), overall, these markets still differ from developed markets in their high liquidity risk and limited availability of high quality, large capitalization shares.

The literature provides plenty of evidence suggesting the existence of higher volatility and price changes in emerging stock markets (Salomons & Grootveld, 2003; Appiah-Kusi & Menyah, 2003; Harvey et al., 2000; Kawakatsu & Morey, 1999; Bekaert et al., 1998; Bekaert & Harvey, 1997; De Santis & Imrohoroglu, 1997; Bekaert et al., 1997; Schaller & Van Norden, 1997). Also, compared to developed markets, common characteristics of emerging markets include a high degree of country risk (i.e., political risk, economic risk, and financial risk), currency devaluations, failed economic plans, financial shocks, and capital market reforms. Thus, the higher degree of risk typically associated with emerging markets suggests a higher expected rate of return in these markets. However, some researchers (Harvey, 1995; Bekaert, 1995) suggest the opposite to be true. Therefore, the main motivation for this research is to investigate (a) whether emerging market returns are exposed to more volatility compared to those of their more developed counterparts, (b) how the realized rates of return in the two types of markets compare to each other, (c) whether there exists a measurable difference in risk characteristics between the two types of markets, and (d) how consistent these results are over the period from 1994 through the end of 2001. The year 1994 was selected as a starting point for the comparison since that is the first year where the returns for a sufficiently large number of emerging market countries was reported with any consistency.

The remainder of this paper is organized as follows: Section II discusses the data and methodology, which is followed by the findings, which are discussed in Section III. The paper concludes with a conclusion in Section IV.

DATA AND METHODOLOGY

This research relies on the weekly national stock indices of the developed and emerging markets, as reported by *Morgan Stanley Capital International* (MSCI). The company categorizes equity markets by a number of factors such as gross domestic product per capita, local government regulations, perceived investment risk, foreign ownership limits and capital controls.

The MSCI Emerging Markets Index measures the equity market performance in the global emerging markets. As of 2001, this index consists of the following 26 emerging market country indices: Argentina, Brazil, Chile, China, Colombia, Czech Republic, Egypt, Hungary, India, Indonesia, Israel, Jordan, Korea, Malaysia, Mexico, Morocco, Pakistan, Peru, Philippines, Poland, Russia, South Africa, Taiwan, Thailand, Turkey, and Venezuela.

As of 2001, the MSCI developed equity markets are made up of the national stock indices of the following 23 countries: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Hong Kong, Ireland, Italy, Japan, Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland, the United Kingdom, and the United States. MSCI also

reports a World Index, which is a free float-adjusted market capitalization index designed to measure market equity performance for the above-mentioned 23 developed markets.

The combined market capitalization of the companies that comprise any of these indices represents approximately 60 percent of the aggregate market value of the various national stock exchanges. Since these national indices are constructed on the basis of the same design principles and are adjusted by the same formulas, they are fully comparable with one another. The above mentioned indices, representing market-weighted price averages without dividends reinvested, were retrieved from *Morgan Stanley Capital International* (MSCI). The company reports Thursday's closing prices as the weekly prices. Other financial services such as Standard & Poor's and Value Line, among others, also report "during-the-week" observations for their weekly data. The MSCI indices are considered performance measurement benchmarks for global stock markets and are accepted standards used by global portfolio managers. Each one of the country stock indices is composed of stocks that broadly represent the stock composition of their respective countries.

The mean annual geometric returns are calculated as follows:

$$GR_j = (1 + R_1)\,(1 + R_2)\,(1 + R_3)\,\ldots\,(1 + R_{52}) - 1 \qquad (1)$$

where R_1 is the weekly return (for week # 1) for country j after conversion from the local currency into the U.S. dollar.

A country's overall risk score is based on the rating of the Heritage Foundation's *Index of Economic Freedom*. This overall risk score is a function of a country's trade policy, fiscal burden, government intervention, monetary policy, foreign investment, banking and finance, wages and prices, property rights, regulations, and the degree to which a black market exists. The scores can range from 1 (best) to 5 (worst). In recent years, the scores for countries with the best rating were around 1.5; countries with the worst risk score rated 5.

RESULTS

Table 1 reports the returns and risk, the latter measured in standard deviation in the rates of return, for the equally-weighted 23 developed markets, the 14 equally-weighted emerging markets, and the value-weighted MSCI World Index by selected time periods over the 1994-2001 time span and by individual years. With the exception of two of the seven time periods examined, the annual returns of the developed markets were higher compared to those for emerging markets. The exception took place for the periods 1998-2001 and 1999-2001, during which emerging markets' returns exceeded those for developed markets. In terms of variations in returns, however, in all cases, the standard deviation of the returns for developed markets were lower compared to those for emerging markets. The results for the value-weighted MSCI World Index, where the returns on the larger markets are more heavily weighted, largely mirror those of the equally-weighted developed

markets. Thus, while the degree of risk was consistently higher in emerging markets, with the exception of the 1998-2001 and the 1999-2001 periods, the realized rates of return in developed markets exceeded those found in emerging markets. In other words, in most years examined, investors in emerging markets do not appear to have been properly compensated for their exposure to more risk.

The return-risk results by individual years confirm the above discussed findings over various time spans. Again, while the risk in emerging markets, measured by the standard deviation in the rates of return, was consistently higher compared to developed markets, in only a few cases (that is, 1999 and 2001) did that translate into higher realized rates of return. Thus, taking risk into account, developed markets' investors fared better compared to their counterparts in emerging markets.

Table 1 also shows the overall risk score for developed and emerging markets. A country's overall score takes into account that country's trade policy, fiscal burden, government intervention, monetary policy, foreign investment, banking and finance, wages and prices, property rights, regulations, and the degree to which a black market exists. Each country's score is averaged over the 1994-2001 period. To arrive at the overall score for developed markets, each of the 23 developed-market-countries' average score is added up and then the total is averaged. The same procedure was used to calculate the overall risk score for the 14 emerging market countries. The results indicate that developed markets are clearly less risky compared to emerging markets (risk scores of 2.09 versus 2.82) and there is less variation in these risk scores among developed market countries compared to emerging market countries (i.e., standard deviation of 0.34 versus 0.51).

Table 2 shows the return and risk characteristics by individual developed countries, which are ranked in the table by recent market capitalization values, over three time spans, that is, 1994-2001, 1997-2001, and 2000-2001. For the overall period (1994-2001), 18 of the 23 developed market countries generated positive returns, while five were negative (i.e., Japan, Hong Kong, Singapore, New Zealand, and Austria). The more recent time span (1997-2001) saw a deterioration in returns with two more countries (i.e., Australia and Norway) joining the previously mentioned five countries with negative returns. Finally, the most recent 2-year period examined (2000-2001) shows every single one of the 23 developed market countries with negative returns. Also, it is of interest to note that for the vast majority of countries, the more recent time periods showed elevated risk levels. In other words, on average, the standard deviation of the rates of return for the period 1997-2001 is higher compared to the corresponding standard deviations for the 1994-2001 period, and the standard deviations for the 2000-2001 period tend to be higher compared to those over the 1997-2001 time frame.

Table 3 reports statistics comparable to those shown in Table 2 except the information pertains to emerging market countries. For the 1994-2001 period, of the 12 countries for which returns could be calculated, seven generated positive returns, while for five, the returns were negative. Over the more recent time span 1997-2001, of the total of 14 reporting emerging markets, eight generated negative returns and six were positive. As was true for developed market countries,

every single one of the 14 emerging market countries' returns for the most recent period 2000-2001 were negative.

In terms of risk, while the standard deviation of most of the emerging market countries' rates of return tended to be higher compared to those found in developed market countries, unlike the latter, there was no tendency for the standard deviations of the rates of return in emerging market countries to have increased in the more recent time spans.

The results reported in the tables are graphically expressed in Exhibit 1, which shows the risk-return patterns of developed and emerging stock markets by individual years and by the overall period 1994-2001. One notices that, with the exception of the years 1999 and 2001, the mean annual returns for developed stock markets exceed those of emerging stock markets. Also, the exhibit clearly reveals a higher degree of risk (measured by the standard deviation around the mean returns) for emerging stock markets in every single year examined.

CONCLUSION

This paper compares the risk and return profile of emerging and developed stock markets over the period from 1994 through 2001. Specifically, this study investigates, from a U.S. investor's point of view, whether a measurable difference in risk characteristics exists between the two markets and whether the realized rates of return in these two types of markets reflect these risk characteristics. In addition, we examine the consistency of these risk/return relationships for emerging and developed markets over time. The results show that the risk associated with emerging markets, as measured by the volatility of returns, is notably higher than the risk in developed markets in most periods. However, the returns in emerging markets have been notably lower than those in developed markets for most of the time frames examined. The findings suggest that risk-averse investors seeking higher returns in volatile emerging markets have not been well-compensated for assuming the higher risk associated with these markets.

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Table 1: World Markets Return and Risk Characteristics Based on Conversions into U.S. Dollars January 1994 - December 2001

	Developed Markets:		Emerging Markets:		MSCI World Index:	
	Geometric Mean Annual Return:	Std. Dev.:	Geometric Mean Annual Return:	Std. Dev.:	Geometric Mean Annual Return:	Std. Dev.:
Period Annual Averages:						
1994-2001	.08068*	.02948	.00658#	.05029	.07839	.02048
1995-2001	.08646*	.03012	.01090#	.05052	.08482	.02160
1996-2001	.07653	.03149	.02853	.05853	.06822	.02335
1997-2001	.06065	.03437	.02112	.06285	.05782	.02568
1998-2001	.04668	.03595	.05119	.06416	.04566	.02762
1999-2001	-.01835*	.03392	.09289	.05665	-.02716	.02838
2000-2001	-.16670	.0385	-.20424	.05675	-.15876	.03288
Annual Averages by Year:						
2001	-.18111	.03677	-.13558	.06001	-.17856	.02698
2000	-.15228	.03494	-.27290	.05349	-.13895	.03878
1999	.27834	.03006	.68716	.05647	.23602	.01937
1998	.24176	.04204	-.07392	.08670	.26412	.02534
1997	.11655	.02802	-.09915	.05759	.10647	.01790
1996	.15591	.01709	.06559	.03586	.12022	.01170
1995	.14602	.02192	-.09469#	.04344	.18442	.01112
1994	.04023	.02499	-.02387#	.04868	.03341	.01265
Country Risk Score:º						
1994 - 2001:	2.09	0.34	2.82	0.51		

Averages exclude 1994 and 1995 returns for China and South Africa, which were not reported.

º A country's average overall risk score was generated based on information from the *Heritage Foundation's Index of Economic Freedom.*

Table 2: Developed Markets Return and Risk Characteristics by Country Based on Conversions into U.S. Dollars

	Average1994-2001:		Average 1997-2001:		Average 2000-2001:	
	Geometric Mean Annual Return:	Std. Deviat.:	Geometric Mean Annual Return:	Std. Deviat.:	Geometric Mean Annual Return:	Std. Deviat.
U.S.	.13734	.02347	.10574	.02883	-.12899	.02911
Japan	-.01499	.02886	-.03420	.03415	-.29891	.03070
U.K.	.06328	.02126	.03652	.02433	-.14440	.02668
Germany	.07448	.02753	.06318	.03390	-.20559	.03925
France	.09281	.02593	.10364	.03034	-.14654	.03420
Australia	.02335	.02542	-.01017	.02719	-.06755	.02734
Switzerland	.10769	.02435	.08459	.02762	-.09073	.02756
Netherlands	.09456	.02658	.04236	.03370	-.14980	.03032
Italy	.09117	.03249	.10591	.03252	-.15817	.03468
Canada	.09531	.02606	.07893	.03156	-.08885	.03457
Spain	.12670	.03032	.09398	.03462	-.14813	.03757
Hong Kong	-.00057	.03957	-.03323	.04420	-.19375	.03781
Sweden	.16700	.03651	.10610	.04365	-.26075	.05179
Belgium	.07823	.02433	.05743	.02924	-.16352	.03583
Finland	.38586	.04822	.46959	.05739	-.27849	.07583
Denmark	.09517	.02329	.08106	.02700	-.07427	.02942
Singapore	-.00160	.03351	-.00531	.04068	-.27603	.03683
New Zealand	-.03498	.03263	-.12777	.03679	-.15593	.03751
Greece	.12367	.04111	.17646	.05045	-.33193	.04662
Portugal	.07471	.02730	.04583	.03282	-.18445	.03115
Norway	.04616	.02778	-.02113	.03153	-.08530	.02795
Austria	-.05175	.02632	-.05859	.02878	-.10129	.03015
Ireland	.08200	.02516	.03408	.02909	-.10071	.03176

Table 3: Emerging Markets Return and Risk Characteristics by Country Based on Conversions into U.S. Dollars

	Average 1994-2001:		Average 1997-2001:		Average 2000-2001:	
	Geometric Mean Annual Return	Std. Deviation:	Geometric Mean Annual Return:	Std. Deviat:	Geometric Mean Annual Return:	Std. Deviat.:
Taiwan	.00259	.04169	-.06381	.04803	-.27441	.05691
China	n/a	n/a	-.23023	.12775	-.28943	.10282
South Africa	n/a	n/a	.05874	.07756	-.20069	.06863
Brazil	.09370	.05767	-.00783	.06019	-.21172	.04425
Korea	.17719	.05777	.32359	.07432	-.17798	.05504
India	-.00107	.03846	.05137	.04121	-.21833	.04740
Malaysia	-.01738	.04859	-.03777	.05945	-.16685	.03472
Mexico	.04419	.05266	.17747	.05231	-.14980	.03032
Chile	.01040	.03210	-.01999	.03219	-.08029	.02651
Argentina	-.03339	.05417	-.05512	.05794	-.24466	.06370
Israel	.05926	.03819	.12930	.04221	-.03993	.05458
Philippines	-.12030	.04276	-.19098	.04930	-.28921	.04454
Thailand	-.13687	.05620	-.10843	.06854	-.17923	.04897
Turkey	.21035	.08321	.38688	.08889	-.46290	.09412

INDUSTRIAL RELATIONS AND U.S. DIRECT INVESTMENT ABROAD: THE IMPACT OF FOREIGN LABOR MARKET RESTRICTIONS

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ABSTRACT

Using a new measure of labor market freedom from the Economic Freedom of the World Report, 2001, the authors estimate the impact of labor market regulations in 16 OECD and 11 non-OECD countries on U.S. direct investment abroad. Previous research relating labor market regulation to foreign direct investment has used subjective measures of the intensity of the regulatory environment. In addition, prior research combines OECD and non-OECD countries in the estimation procedure. The authors find that the new more objective measure of labor market regulation results in a highly significant and robust coefficient for OECD countries, but is not significant for non-OECD countries. U.S. firms are less likely to invest in OECD countries where job security provisions are high. Furthermore, we find that OECD and non-OECD countries respond differently to the determinants of foreign direct investment and therefore those sets of countries should be estimated separately.

INTRODUCTION

Both the popular press and academic literature have given significant attention to corporate international decision making. This focus should not be surprising given the increasingly global nature of our economy. Thus, we face a paramount need to clarify our understanding of how firms make decisions regarding international issues, such as determining foreign production locations. One important, though largely ignored, avenue of economic research is the role that labor laws and/or institutional restraints (specifically, hiring and firing laws or *job security provisions*) play in a firm's decision to locate production or service facilities within another country.

Labor economists have produced many studies regarding the additional explicit and implicit costs faced by firms located within countries with job security provisions which inhibit a firm's ability to reduce the size of their workforce. The U.S. is one of the only countries in the world that

preserves the right to "fire at will". The primary form of restriction faced by firms located in the U.S. today is the 1988 Worker Adjustment and Relocation Notification Act (WARN). WARN requires large employers (with more than 100 employees) to give their employees 60 days advance notice before shutting down or conducting large layoffs. No severance pay is required by these firms unless previously negotiated through collective bargaining. However, with no enforcing body to supervise the Act, it has virtually no impact on the provision of advance notice of the length mandated by law (Addison and Blackburn, 1994). U.S. job security is further thwarted by the notion that simple *threats* of plant closings impede the impact of union activity in the U.S. (*Worklife Report*, 2001).

Alternatively, most European firms face far more stringent levels of worker protection. For example, laid-off workers in Spain are entitled to receive up to 45 days' pay for each year of service (*The Jobs Letter*, April 1996). According to Bertola, Boeri, and Cazes (1999, Annex C), firms in Germany must notify a *works council* prior to any alteration of running a business that entails any measure "which might have disadvantageous consequences for the workforce or substantial sections of the workforce." This works council is required to "examine ways in which the redundancies can be avoided or reduced" and devise a social *compensation plan*. In fact, firms in many OECD countries must have termination conditions and compensation examined by a works council. Termination must be for legitimate economic reasons to be justifiable. Even hiring costs can also be substantial when works councils are involved. Recently, a bid from Volkswagon to expand its labor force within Germany was rejected because the company only offered three year contracts rather than lifetime contracts (Williams, 2001).

Many studies have shown how stringent statutory job security provisions such as these in Europe raise unemployment within a country. For examples, see Bierhanzl and Gwartney (1998); Siebert (1997); and Lazear (1990). Once the employer has made the decision to hire workers, they are much less likely to fire workers. Siebert (1997) explains that this makes the hiring decision a "somewhat irreversible investment with a longer horizon than buying a machine" (p. 49) and stresses that this reduces the incentive to create new jobs. Others have disputed these findings (Addison, Teixeira, and Grosso (2000); Nickell (1997); and Scarpetta (1996)). While not the topic of this paper, our data also show a positive correlation between hiring/firing provisions and unemployment rates within countries. Some studies of job security provisions have focused on employment fluctuations rather than this correlation. Bertola, Boeri, and Cazes (1999) find that more stringent job security provisions, by making firing decisions more costly, are "associated with smoother dynamic employment patterns" (p. 5). That is, unemployment may be higher, but it fluctuates less. This supports the conclusions reached by Abraham and Houseman (1994) who find that more stringent job security provisions do not make labor markets inflexible because firms tend to adjust hours rather than employment. While extensive research linking hiring/firing costs with unemployment rates and fluctuations exists, very little attempt has been made to link the foreign direct investment and hiring/firing cost. Our research will focus on our belief that these provisions

reduce the incentives of U.S. firms, who are accustomed to more lenient hiring/firing arrangements, to invest in those countries where these costs are higher.

Linking foreign direct investment research with labor cost regulation research would allow one to determine the impact of regional differences in job security provisions on a firm's decision to locate within a foreign country. Economic theory predicts that, holding all other location and firm characteristics constant, the greater the level of statutory job security provisions faced by a firm, the less likely that firm will want to locate in that area. A few studies have already looked into this issue. Carey and Spradlin (1997) tests for the impact of relative termination costs on a foreign firm's desire to locate in a particular state in the U.S. relative to producing at home. They find that ease of firing has a positive and statistically significant impact on the level of foreign direct investment into the U.S. Cooke (1997) and Cooke and Noble (1998) test the impact of labor regulations and institutions on the level of investment by U.S. firms into foreign countries. Cooke (1997) looks only at OECD countries and Cooke and Noble (1998) look at OECD and non-OECD countries combined. Using OLS, they found that U.S. firms invested less in industries located in countries that had highly restrictive layoff policies. All three of these previous studies use subjective, author defined measures of labor market regulation which will be a point of departure for this study.

Our study begins with the theoretical premise of the relationship between foreign direct investment and job security factors. We determine the statistical importance that job security provisions have on the level of U.S. foreign direct investment in 27 countries around the world, using, in part, newly released data from the *Economic Freedom of The World 2001 Annual Report.* We believe that the indexed measure of labor market regulation taken from this *Annual Report*, is a more objective and complete measure of the degree of labor market regulation than the measures used in previous research. Our study finds that these job security provisions are a statistically significant deterrent to the level of foreign direct investment in OECD countries but are not significant for non-OECD countries. Furthermore, we conclude that OECD and non-OECD countries should not be combined and respond differently to various determinants of foreign direct investment.

COMBINING FDI AND JOB SECURITY PROVISIONS

A large literature already exists that examines the determinants of foreign direct investment, FDI. Many of these determinants summarized and classified by Seyf (2001) include: lower relative rate of return at home, lower costs of production abroad (thus turning the location into an export platform), seeking new markets, acquiring new technology, overcoming tariff and other protective restrictions, localizing production to service a foreign market, market diversification, and competition. Other studies have included agglomeration, infrastructure, and labor market variables. Empirical models of FDI typically focus on variables that represent some or all of these determinants.

Cooke and Noble (1998); Carey and Spradlin (1997); and Cooke (1997) extend these determinants to specifically include the impacts of job security provisions embodied in industrial relations systems. These studies attempt to deal with the common problem of ranking the strictness of employment protection legislation. Carey and Spradlin (1997) use the percentage of short term employment and average job tenure rates to proxy the employer-employee commitment. Cooke (1997) and Cooke and Noble (1998) use dummy variables to represent various employment protection measures. Though not an FDI study, Bertola, Boeri, and Cazes (1999) extensively examine the theoretical implications of employment protection on labor market outcomes of OECD countries. They highlight the difficulties encountered when trying to rank OECD countries based on employment protection legislation. Specifically, since most notice periods and severance pay agreements are negotiated rather than legislated, one would have to look at average outcomes of these negotiations. We are able to circumvent some of these problems in this study by using newly released survey data.

We use data from a subset of countries included in the *Economic Freedom of The World, 2001 Annual Report. This data, which looks at 58 countries more in-depth than the original 123 countries in the Annual Report*, is summarized in Gwartney, Skipton, and Lawson (2001). The data is compiled from two surveys of thousands of top and mid-level executives doing business in one or more countries. The surveys are reported in *Global Competitiveness Report* and *World Competitiveness Yearbook*; which attempt to measure the attractiveness of a country with respect to business activity. These surveys ask questions relating to hiring and firing flexibility. More specifically, the index measures the extent to which "hiring and firing practices of companies are determined by employers" (Gwartney, Skipton, and Lawson, 2001). The *rating* is based on a scale of 1 to 10 with 10 indicating no government restriction on hiring and firing practices. Table 1 summarizes the top and bottom five countries in our study and their rankings. (The countries included in our study are: Argentina, Australia, Austria, Belgium, Brazil, Canada, China, Ecuador, France, Germany, Greece, Hong Kong, India, Ireland, Israel, Japan, Korea, Malaysia, Netherlands, New Zealand, Philippines, Singapore, Spain, Sweden, Thailand, Turkey, United Kingdom.) On average, non-OECD countries have less restrictive job security provisions than OECD countries (the test was rejected with less than a five percent level of significance). We expect, *ceteris paribus*, that U.S. firms will more likely locate in countries where hiring and firing costs are lower. While restrictive labor policies are meant to protect workers from inappropriate treatment by employers, we will show that they inadvertently decrease the desire of a foreign firm to locate in that country, and the country loses any potential benefit that might have resulted.

Table 1: Country Ranking of Hiring and Firing Legislation*
USA: Rating = 6.00

OECD			Non-OECD		
Country	Rank	Rating	County	Rank	Rating
Canada	1	5.5	Singapore	1	7.5
Turkey	2	5.3	Hong Kong	2	7.2
Korea	3	5	Israel	3	5.7
Japan	4	4.3	Thailand	4	5.3
UK	5	4	Philippines	5	4.7
--	--	--	--	--	--
Austria	12	2.5	Brazil	7	4
France	13	2.3	Ecuador	8	3.8
Belgium	14	1.8	Argentina	9	3.5
German	15	1.7	Malaysia	10	3.3
Sweden	16	1.5	India	11	2.3

• A rating of 10 signifies "no employment security protection."
Source: Economics Freedom of the World 2001 *Annual Report,* 2001.

MODEL OF FOREIGN DIRECT INVESTMENT BASED ON HIRING/FIRING COSTS

The model developed here is an adaptation of the Carey and Spradlin (1997) model of the foreign direct investment decision in the presence of hiring and severance costs and Wendling's (1984) plant closing model. This is a two period, multi-year model where a firm must decide between expanding investment in Country A and expanding in Country B. For simplicity, our theoretical model focuses only on the cost decision and not on the many other factors relevant to the FDI decision. Also, for simplicity, we assume that revenues accruing to the home firm will be the same, regardless of the location decision of the firm (i.e., the firm will sell output from either location to many countries and revenue success will not be linked to the host country).

The firm assumes that there is some positive risk of failure, regardless of which country it invests. Thus the difference in severance costs, S_i, becomes more important as this risk of failure rises. Holding the various exchange rates constant and putting all costs in the home currency, the

firm will incur hiring costs, H_i, wage costs, W_i and nonlabor production costs k_i, where I represents Country A or B. The firm must consider the costs of operating in A or B:

$$\mathbf{c_A} = \mathbf{H_A} + \sum_{\mathbf{s=0}}^{\mathbf{U}} \frac{(\mathbf{k_{As}} + \mathbf{W_{As}})}{(\mathbf{1}+\mathbf{r})^{\mathbf{s}}} + \mathrm{E}\left[(1-\rho)\sum_{\mathbf{t=U+1}}^{\mathbf{V}} \frac{(\mathbf{k_{At}} + \mathbf{W_{At}})}{(\mathbf{1}+\mathbf{r})^{t}} + (\rho)\frac{\mathbf{S_A}}{(\mathbf{1}+\mathbf{r})^{\mathbf{U+1}}}\right] \qquad (1)$$

$$\mathbf{c}_B = \mathbf{H}_B + \sum_{\mathbf{s=0}}^{\mathbf{U}} \frac{(\mathbf{k}_{Bs} + \mathbf{W}_{Bs})}{(\mathbf{1}+\mathbf{r})^{\mathbf{s}}} + \mathrm{E}\left[(1-\rho)\sum_{\mathbf{t=U+1}}^{\mathbf{V}} \frac{(\mathbf{k}_{Bt} + \mathbf{W}_{Bt})}{(\mathbf{1}+\mathbf{r})^{t}} + (\rho)\frac{\mathbf{S}_B}{(\mathbf{1}+\mathbf{r})^{\mathbf{U+1}}}\right] \qquad (2)$$

where r is the common discount factor and ρ is the probability of failure in period 2. Period 1 is represented as s = 0,..,U and period 2 is represented by t = U+1,...,V.

Equations (1) and (2) illustrate the different factors of locating in each country that a firm must consider for each period. In period 1 (s = 0,...,U), the firm considers the costs of hiring workers and the present discounted value of labor and other production costs incurred in that period. In period 2 (t = U+1,....,V), the firm must consider the probability of failure at some point in the future. If there is a 100% probability that the firm will continue to operate in this country until the year V, then the cost decision relies on the wage savings minus the hiring costs. Severance costs are irrelevant. A more realistic assumption is to assume that failure is a possibility - even if it is remote. As that probability of failure rises, the likelihood of incurring severance costs rises. This could outweigh any wage savings gained by locating in the country.

If we set costs equal and then rearrange, we can compare the costs of locating in either country. We get the following decision rule (again, for simplicity, set $k_{As}=k_{Bs}$ and $k_{At}=k_{Bt}$):

$$\mathbf{H_A} - \mathbf{H_B} + \sum_{\mathbf{s=0}}^{\mathbf{U}} \frac{(\mathbf{W_{As}} - \mathbf{W_{Bs}})}{(\mathbf{1}+\mathbf{r})^{\mathbf{s}}} > \mathrm{E}\left[(\mathbf{1}-\rho)\sum_{\mathbf{t=U+1}}^{\mathbf{V}} \frac{(\mathbf{W_{Bt}} - \mathbf{W_{At}})}{(\mathbf{1}+\mathbf{r})^{\mathbf{t}}} + (\rho)\frac{(\mathbf{S_B} - \mathbf{S_A})}{(\mathbf{1}+\mathbf{r})^{\mathbf{U+1}}}\right] \qquad (3)$$

The left side of equation (3) represents the sum of the savings in hiring costs plus the present discounted savings in wage costs of investing in Country B in the short run. The right side of equation (3) represents the expected present value of excess future wage cost in Country B over Country A plus the present value of the difference in severance costs in the second period. If the first period savings are greater than the second period cost, then the firm will choose to invest in Country B. If wages are lower in Country B, then the first term on the right side is likely to be negative; however, as the probability of failure rises, then the difference in severance costs become more important. In other words, if wages are lower in Country B than in Country A, we can no longer simply assume that the domestic firm will locate in Country B, ceteris paribus. High severance costs in Country B may be enough to make the right side of Equation (3) positive and

greater than the left side, thus, offsetting any wage savings from locating in Country B. Note that it is likely that hiring and firing costs are correlated. This correlation would reinforce the effect just described.

DATA DESCRIPTION AND ESTIMATION RESULTS

Data for our study were compiled from a variety of domestic and international data sources. The specific sources for each variable are found in Appendix I. Our measure of foreign direct investment, U.S. direct investment abroad, covers 27 countries (16 OECD, 11 non-OECD) and 8 (7 manufacturing and wholesale trade) industries for a total of 216 observations. Because of the potential scale effects associated with investing into these countries, each value of investment is divided by the destination country's GDP for 1999. For example, U.S. firms had approximately the same amount of food manufacturing investment in Ecuador ($76 million) and Israel ($78 million). However, the $76 million in Ecuador was approximately 0.4% of Ecuador's GDP while the $78 million was approximately 0.08% of Israel's GDP. Thus, our actual dependent variable is a scaled measure of foreign direct investment and is expressed as a percentage. The remainder of our data set, which includes variables such as growth in GDP and wage rates, is country specific. Variable definitions are summarized in Table 2 and descriptive statistics for our sample are found in Table 3.

Table 2: Data Definitions

Variable	Identifier	Definition
Scaled USDIA (%)	USDIA	Investment position abroad on a historical-cost basis for 8 manufacturing industries and wholesale trade (1999) divided by the 1999 RGDP in the destination country. Note that if the equity position of the domestic firm toward their foreign affiliate is outweighed by their loans to the affiliate, the investment position could be negative.
Hiring/Firing Regulation Index (Scaled 1-10)	HIREFIRE	Based on the extent to which hiring and firing practices are determined by employers, survey responses from 1999-2000. The larger the index value, the less government intervention.
Wage ($/hour)	WAGE	Manufacturing wages converted using dollar exchange rate and inflation adjustments when needed, 1998. For those countries reporting wages on weekly or monthly basis, calculations assume: 44 labor hours per week, 192 labor hours per month.
Political Risk Index (Scaled 1-25)	POLRISK	Risk analysts, risk insurance brokers and bank credit officers scored each country. The maximum score of 25 indicates no risk of non-payment; zero indicates that there is no chance of payments being made. Risk was defined as the risk of non-payment or non-servicing of payment for goods or services, loans, trade-related finance and dividends, and the non-repatriation of capital.

Table 2: Data Definitions		
Variable	Identifier	Definition
Exchange Rate Variability (%)	XRATE	Coefficient of variation of real exchange rates in US dollars between 1994-1998 using 1995 as base year.
Growth in RGDP (%)	GDPGRO	GDP growth on an annual basis adjusted for inflation, 1997-1998.
Interest Rate (%) (for all but Brazil and Turkey) Interest Rate (%) (Brazil and Turkey)	INTRATE	Average annual lending, 1998. Average annual lending rate to enterprises, 1998 (Brazil). Average short-term commercial lending rate, 1998 (Turkey).
Trade Restrictions Index (Scaled 1-10)	TRADE	Based on the extent to which a country has freedom to trade with foreigners, 2000. The larger the index value, the more freedom in trade that the country experiences.
Corporate Tax Rate (%)	CORPTAX	As reported on January 1, 1999

Table 3: Descriptive Statistics					
Variable	OECD		NON-OECD		U.S. Values
	Mean	Max	Mean	Max	
	(Std. Dev.)	(Min)	(Std. Dev.)	(Min)	
Scaled USDIA	0.37	3.72	0.44	6.38	
	(0.64)	(-0.06)	(1.02)	(-0.03)	
Hiring/Firing Practices	3.27	5.50	4.65	7.50	6.00
	(1.21)	(1.50)	(1.56)	(2.30)	
Wage	10.69	16.51	3.17	9.37	13.49
	(3.93)	(1.20)	(3.06)	(0.18)	
Political Risk Index	21.87	25.00	15.12	22.22	25.00
	(3.52)	(11.11)	(3.45)	(9.19)	
Exchange Rate Variability	10.65	35.17	11.25	27.41	.
	(6.83)	(4.56)	(8.13)	(2.12)	
Growth in RGDP	2.36	9.50	0.11	7.80	3.90
	(3.31)	(-6.80)	(4.90)	(-8.50)	
Interest Rate	8.41	18.56	21.25	68.18	8.35
	(3.98)	(2.32)	(19.01)	(6.39)	

Table 3: Descriptive Statistics					
Variable	OECD		NON-OECD		U.S. Values
	Mean	Max	Mean	Max	
	(Std. Dev.)	(Min)	(Std. Dev.)	(Min)	
Trade Restrictions Index	7.97	8.90	7.56	9.80	7.90
	(0.62)	(6.60)	(1.36)	(5.90)	
Corporate Tax Rate	35.72	48.00	29.09	36.00	40.00
	(5.45)	(28.00)	(7.08)	(15.00)	
n	128		88		

Our independent variables can be broken down into four categories: labor market factors (HIREFIRE, WAGE), output market factors (INTRATE, XRATE, GDPGRO, TRADE), production environment factors (POLRISK, CORPTAX), and eight industry dummies meant to capture immeasurable, industry specific variations in U.S. direct investment abroad. The following ordinary least squares model of U.S. direct investment abroad was estimated separately for the 16 OECD and the 11 non-OECD countries:

$$USDIA_{i,j} = \alpha_{i,j} + \overset{+}{\beta} HIREFIRE_i + \overset{-}{\beta}_2 WAGE_i + \overset{+}{\beta}_3 POLRISK_i + \overset{+/-}{\beta}_4 XRATE_i + \overset{+}{\beta}_5 GDPGRO_i + \overset{+}{\beta}_6 INTRATE_i + \overset{-}{\beta}_7 TRADE_i + \overset{-}{\beta}_8 CORPTAX_i + \sum_{j=1}^{7} \overset{+/-}{\beta}_j IND_j + \varepsilon_{i,j}$$

The expected signs for each variable appears above the coefficient. The results for these estimations, separated by OECD and non-OECD countries, can be found in Table 4. Note that the results were tested and corrected for heteroscedasticity using White's Method. Following Cooke and Noble (1998), our initial estimation covered all 27 countries. However, we believe it likely that the U.S. FDI model will respond differently for OECD and non-OECD countries. A straightforward, highly significant F-test confirmed our decision to continue our estimations with OECD and non-OECD countries separated.

Table 4: Regression Results		
OECD and NON-OECD Countries		
Explanatory Variable	OECD Estimate (s.e.)	NON-OECD Estimate (s.e.)
Constant	-6.405***	-2.063
	(1.435)	(1.757)

Table 4: Regression Results		
OECD and NON-OECD Countries		
Explanatory Variable	OECD Estimate (s.e.)	NON-OECD Estimate (s.e.)
Hiring and Firing Practices	0.309***	0.012
	(0.045)	(0.151)
Wage	-0.003	0.131*
	(0.035)	(0.078)
Political Risk Index	0.050	0.220**
	(0.047)	(0.109)
Exchange Rate Variability	0.013	0.081
	(0.016)	(0.053)
Growth in RGDP	0.091*	0.084
	(0.051)	(0.67)
Interest Rate	0.019**	-0.008
	(0.009)	(0.010)
Trade Restrictions Index	0.461**	-0.549
	(0.186)	(0.390)
Corporate Tax Rate	0.022	-0.071*
	(0.015)	(0.039)
INDUSTRY (Other Mfg. Omitted)		
Food and Kindred Products	-0.359*	-0.250
	(0.181)	(0.212)
Chemicals and Allied Products	0.161	-0.051
	(0.264)	(0.176)
Primary and Fabricated Metals	-0.505***	-0.337*
	(0.191)	(0.187)
Industrial Machinery and Equipment	-0.476**	0.406
	(0.190)	(0.430)
Electronic and Other Electrical	-0.347*	0.765*
	(0.193)	(0.413)
Transportation Equipment	-0.428**	-0.316*
	(0.199)	(0.177)

Table 4: Regression Results		
OECD and NON-OECD Countries		
Explanatory Variable	OECD Estimate (s.e.)	NON-OECD Estimate (s.e.)
Wholesale Trade	-0.122	0.162
	(0.214)	(0.246)
Adjusted R^2	0.36	0.22
n	128	88
*, **, *** Significant at the 10%, 5%, and 1% levels, respectively.		

Note that the theoretical model described above leads to a classic selection problem in our empirical analysis. Our theory suggests that a firm which has a high probability of failure would be less likely to invest in a country with costly firing regulations. However, we only observe investment information on those firms that decided it worthwhile to pursue the investment. Therefore, we cannot truly test the degree to which our theoretical FDI determinants impact all U.S. firms considering investing abroad, only the impact those determinants have on firms that have made the decision to invest abroad. Because the data to correct for this selection problem is not available, all of our results should be interpreted as relevant for only those firms that have decided to invest in country I and industry j.

The coefficient in which we are most interested is that for the hiring and firing index. The equation was estimated using the index described above and the natural log of the index. Because the results are so similar, we do not present the regression results for the transformed variable. Our theory suggests that if a country has lower hiring and firing costs, a firm is more willing to invest into that country. Recalling that a larger value of the hiring and firing index suggests a reduction in the level of hiring and firing regulations, we expect and find a positive, statistically significant result for OECD countries. We find that a one unit increase in the index, whose average value for OECD countries is 3.27, would increase the level of scaled U.S. direct investment abroad by approximately .31, *ceteris paribus*.

The impact of these restrictions on non-OECD countries, with an average index equal to 4.65, is not statistically different from zero at any reasonable level of significance. We are not surprised by this result for several reasons. First, given that the ease of the restrictions are closer on average to the U.S. (index equals 6.00), one would expect that this determinant to FDI to be less important to U.S. firms. Also, given that severance costs are frequently based on wage costs and that wage costs are so much lower in these countries, severance costs are likely to be lower, as well. This makes this part of the investment decision less relevant for non-OECD countries. Finally, the underground market environment in many of these developing nations is such that legal restrictions may be difficult to enforce, making these regulations less important in the investment decision.

Our remaining labor market factor is the wage cost. We recognize that total labor cost, not wages, is the information a firm would need to estimate its cost of producing abroad. Unfortunately the labor cost data are not available for two of the non-OECD countries. Because of the relatively high correlation (0.94) between wages and the labor cost data obtained from the remaining 25 countries, wages serve as a proxy for total labor cost in our model. According to standard labor market theory and the FDI theory we have described above, firms would be less likely to locate in an area with higher labor costs. However, we find that higher wages increase the level of scaled USDIA in non-OECD countries by 0.13. We believe this positive bias in our coefficient may exist because wages in non-OECD are picking up some measure of productivity or education that is not being captured within OECD countries. A measure of education or quality of the workforce, mean years of schooling, was used in earlier specifications of the model. We found that the high degree of correlation between wage and education (.83) was blanketing the role of either in the estimation. An equally interesting and unexpected result is that wages were *not* found to be significant in the model for OECD countries. Further examination of the data shows that the level of political risk in OECD countries is very highly correlated with wages (0.93). This correlation suggests that the political risk variable may be obscuring the statistical importance of wages in OECD countries. To investigate this further, we re-estimated the model excluding the political risk variable and the coefficient on wage became statistically significant. This result further suggests that multicolliniarity may explain the lack of significance in the reported model.

Of our output market factors - the interest rate, trade restrictions, and growth in real GDP are significant for OECD countries, but they are not significant for non-OECD countries. Our theory predicts that a firm with a longer time horizon would be more willing to face the expenses of investing abroad. This effect is enhanced when the probability of failure is low. To the extent that higher interest rates reduce the present discounted value of expected future production costs, we predicted the interest rate would have a positive impact on investment. This positive correlation is often found in empirical studies of FDI that include interest rates. (For examples, see Lin, Szenberg, and Webster, 2001; Yang, 2000; and McDougal, 1960.) The average level of the trade restrictions index is significant and has the predicted negative sign for OECD countries. This result implies that U.S. firms may view less need to physically locate within these countries because of the ease of trading with them, *ceteris paribus*. This is consistent with other studies that find an *increase* in trade barriers would *increase* foreign direct investment in the country (e.g., Karier, 1995). Growth in real GDP represents additional local market potential. Standard FDI theory predicts that firms would increase investment into a country in which market demand is rising. These output market factors did little to explain the variation in investment for non-OECD countries. This is not surprising since it is likely that firms locate in these countries for the overall production cost advantages rather than for the potential success from selling to the local market.

Our measures for production environment - corporate taxes and political risk - are statistically significant for non-OECD countries, but they are not statistically significant for OECD

countries. These results support the theory that higher corporate tax rates in a country would decrease the level of investment. Our measure of the stability of political regimes is positive and statistically significant for these countries. The political risk index we used is created on a 1-25 scale, a rating of 25 indicates, for example, that there is no political risk associated with the payment for goods and services or loans. We expect that a risk neutral firm is less likely to invest in a country where the uncertainty of repayment is high. The positive sign suggests that the safer one's investment is within a country, the greater the level of investment one is willing to make. An increase in this index suggests an increase in scaled direct investment abroad for non-OECD countries, *ceteris paribus.* Cooke (1997), using the same index, also finds a reduction in this type of risk to be positively related to USDIA.

CONCLUSION

We have shown with this research that statutory job security provisions *will* impact the investment decisions of U.S. firms into OECD countries. Furthermore, we have shown this result with a more objective measure of labor market regulation than that used in prior research. Previous studies have often been concerned with the impact of labor market restrictions on output and employment *within* countries. Now we know that there is a more global implication of these restrictions. After considering other relevant factors, U.S. firms are less likely to invest in countries where job security provisions are high. Thus these countries sacrifice the benefits of additional employment, output, productivity, technology transfers, and the like, that might have occurred otherwise. It is somewhat a somber realization that the U.S. remains one of the most attractive investment locations in the world, in part, because firms can relocate, shut down, and fire at will within its borders. However, we must emphasize that the U.S. also does not have the systemic high unemployment found in many OECD countries which has often been attributed to these provisions.

We also show that U.S. firms will respond differently to determinants of foreign direct investment within OECD and non-OECD countries. Our results indicate that U.S. firms are more concerned with the production environment factors and wage rates within non-OECD countries and with labor market regulations and output market factors within OECD countries. Hiring and firing costs arise as a barrier to entry into production within OECD countries. Our results suggests that further research in this area might focus exclusively on OECD countries. After several attempts to find a one-size-fits-all empirical model for explaining FDI, we found that our labor market regulation variable *always* remained stable, and a*lway*s significantly reduced FDI in OECD countries and was insignificant in explaining FDI for non-OECD countries.

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Appendix I: Data Sources	
Variable	Source
US Direct Investment Abroad ($millions)	*Survey of Current Business*, July 2000
Hiring/Firing Regulation Index	*Economic Freedom of the World: 2001 Annual Report*
Wage ($/hour)	*ILO Yearbook of Labour Statistics,* 2000
Political Risk Index (Scaled 1-25)	*Euromoney,* September 1997
Exchange Rate Variability (%)	*International Financial Statistics Yearbook*, 2000 (exchange rates)
Growth in RGDP (%)	*The World Factbook,* 1999
Interest Rate (%) (for all but Brazil and Turkey)	*International Financial Statistics Yearbook,* 2000
Interest Rate (%) (Brazil and Turkey)	*IMF Country Report No. 01/10*, January 2001 (Brazil) *IMF Country Report No. 00/14*, February 2000 (Turkey)
Trade Restrictions Index	*Economic Freedom of the World: 2001 Annual Report*
Corporate Tax Rate (%)	*KPMG Corporate Tax Rate Survey*, January 2000

DETERMINING OWNERSHIP POSITIONS IN ACQUISITIONS: MARKET AND STRATEGIC INFLUENCES ON INVESTMENTS IN EUROPEAN TARGETS

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ABSTRACT

Ownership positions taken in international acquisitions are based on developing efficient organizational arrangements for the purpose of integrating and coordinating activities between the target and the acquirer. This process is influenced by factors within market contexts and by the strategic repertoires of the acquiring firm as they face the complexity of foreign markets.

Regression is used to model these factors influencing the ownership positions of U.S. firms in the acquisition of targets within European Union nations. Results indicate that strategic similarity and to lesser degree market uncertainty influence ownership and that these results differ depending on the cultural proximity.

INTRODUCTION

Merger and acquisition activity has risen dramatically as an internationalization strategy and as a means to establish an immediate foreign presence. Of particular importance in an acquisition is the ability to effectively combine resources and coordinate activities through the use of power and control, where power is one member's potential to influence the decision variables of its partner and align inter-firm resources (Griffith & Harvey, 2001). In recent years researchers have focused on the determinants of power and the control issues implied by various internationalization strategies (Davidson & McFetridge, 1984, 1985; Davis, Desai & Francis, 1999; Contractor, 1990; Erramilli, 1991; Argarwal & Ramaswami, 1992; Anderson & Gatignon, 1986). While this attention has been helpful in determining why various organizational arrangements have been used, its application to merger and acquisition activity has been somewhat simplistic. Much of the internationalization literature presents acquisitions as if targets are always fully acquired in order to classify this organizational arrangement as one that affords a high degree of control to the parent (Caves & Mehra, 1986; Kogut & Singh, 1989).

In reality, international mergers and acquisitions involve various organizational arrangements ranging from minority owned to wholly owned positions, each involving tradeoffs between the extent of control afforded, the amount of risk exposure, and the level of resource commitments

required. Ownership choices in acquisitions are the first in a sequence of strategic steps aimed at effectively combining resources and coordinating activities in global relationships based on the power created from the investment position taken.

Transaction costs arguments suggest that ownership positions are predicated upon economic arrangements aimed at achieving competitive efficiencies across national boundaries. As each transaction involves an acquiring firm and target from different markets and firm orientations, aspects of each are expected to influence the ownership position taken as firms attempt to maximize efficiency and reduce transaction costs. For international acquisitions, ownership positions must also be examined in relationship to the specific context of crossing national boundaries. Economic efficiency is predicated on the strategic allocation of acquisition ownership based on effectively combining resources and coordinating the activities of international relationships. In international acquisitions, this process involves overcoming potentially difficult national differences that lead to greater transaction costs. These differences alter the strength of industry and firm influences as acquiring firms seek to enter markets very different from their own.

In order to understand this aspect of international acquisitions, the paper addresses these issues and examines the degree of ownership an acquiring firm purchases by juxtaposing elements at two levels of analysis: those at the market and firm. The research addresses four key, related issues:

What impact do industry characteristics have on the degree of ownership of an international target firm?
What impact do strategic pre-dispositions have on the degree of ownership of an international target?
Are these different sets of determinants complimentary in their impact on the degree of ownership in international acquisitions?
Do the effects of these determinants differ between national environments?

THEORY AND HYPOTHESES

Owning a large percentage of an international acquisition versus holding a smaller position is important as it involves distinct differences in the commitment of resources by the acquiring firm, as well as the level of control desired in global operations. The choice of ownership level is complicated further when the acquisition involves crossing national boundaries. In order to achieve and maintain control, multinational firms face several complexities not encountered by domestic firms such as communication barriers, difficulties in the evaluation of performance due to exchange rate shifts, and cultural differences between headquarters and subsidiaries (Mascarenhas, 1992). In

the decision to acquire a target firm, a higher degree of ownership provides greater control and power for the parent firm as it organizes its activities. In this way, an acquiring firm increases its decision making authority and monitoring power.

From a transactions cost perspective, the decision regarding the degree of ownership in an international acquisition involves reducing inefficiencies taking place between firms in two markets. At its basis, transactions cost theory argues that the primary purpose of an organization is economizing, to make organizations "efficient" rather than wasteful (Williamson, 1985). Transaction costs focus on administrative issues like "make or buy" decisions, aspects of organization design and structure, and management of administrative and transaction costs. Therefore, it is particularly applicable merger and acquisition activity as it primarily focuses on the necessity of finding an optimal solution to achieve efficiency in the investment and administration of target firm assets within the network of a multinational firm.

Organizing investments in foreign markets have a high degree complexity and uncertainty for an internationalizing firm. Acquiring firms face unclear cultural expectations regarding marketing and human resource practices, inexperience in business negotiations, information about local partners, and the need to integrate the target firm into its current organizational structure and culture. Human actors make decisions in this process with limited knowledge and bounded rationality. They are also mindful of opportunism that can take place within the exchange between parties when there is no structured, organizing arrangement. Therefore, as acquisitive firms seek targets, they make adaptive, and sequential decisions regarding the structure of the acquisition relationship in order to shield the organization from opportunistic behavior while creating the most efficient, economizing arrangement. Each ownership choice is predicated on the attempt to eliminate or reduce the perceived transactions cost that arise from the risk and uncertainty involved in acquiring and integrating an international target.

Transaction costs have long been acknowledged as influenced by the market contexts that exchanges take place in. Market based assets and structures have been demonstrated to impact organizational arrangements that develop global integration and maximize efficiencies (Kale, 1986; Inkpen & Beamish, 1997), particularly the environmental characteristics that create excess costs related to overcoming risk and uncertainty. Dynamic market contexts are sources of ambiguity and complexity as attributes multiply and change. This dynamism is related to technological development, unclear customer demands, changing infrastructure requirements and standards, and most uncertain of all the competitive nature of the industry environment. Markets differ in terms of their levels of instability and complexity and therefore, require organizational arrangements that are particularly suited for them. For cross border actions, firms seek to reduce the costs associated with dynamic environments while integrating the resources of international operations.

An important aspect of industry dynamism is the extent of technological development occurring within a given market. New technologies alter industries structures by making existing products outdated or manufacturing processes obsolete. Technological development within industry,

due to its transitory and destructive nature, is cited as a primary driver of a firm's strategy and structure (Chan, Martin, & Kensinger, 1990; Child, 1972).

Acquisitions are a preferred method for firms to modify or update their technology, as evidenced by the large amount of merger and acquisition activity in high-tech markets. However, competing considerations are involved in determining the initial ownership position taken by an acquiring firm. Typically, members participating in high-tech industries create competitive advantage through technological competencies. These firms invest time and resources into developing these technologies and want to fully realize their rent producing returns. It is likely that they are reluctant to share knowledge with rival firms (Anderson & Gatignon, 1986) or expose themselves to the opportunism that might arise through partnerships.

However, firms in high technology industries also need to collaborate in order to benefit from exposure to other knowledge resources and to offset the large initial costs of new product and technology development. As Kogut and Singh (1989) argue, foreign expansion in high technology industries most likely requires investment in research and development and product adaptation, creating an incentive for firms to pool competencies and overcome risk and cost.

Therefore, firms must decide upon organizational arrangements that reduce the opportunism that may arise through collaboration, while at the same time lowering the expense involved in research and development. Acquisitions with lower levels of ownership appear to be an effective means of lowering both transactions costs that might arise through opportunism while at the same time lowering the costs of research and development. Supporting studies indicate that sharing ownership when it comes to joint ventures is highly preferred in high tech environments (Gomes-Casseres, 1989; Hennart, 1991; Kogut & Singh, 1988, 1989; Yip, 1982). As such, we expect that acquiring firms would invest as minority owners in high technology industries without making extensive resource commitments that comes with purchasing high degrees of ownership. Based on this discussion the following hypothesis is offered:

Hypothesis 1: The level of ownership of international acquisitions will be negatively associated with the level of technological development of an industry.

Another market attribute impacting uncertainty that can lead to transaction costs concerns the rate of growth of the target markets. Increased customer demand, changing industry strategies and standards, and increased competitive rivalry are all conditions of these markets. Rapid growth in international markets reduces entry barriers by creating disequilibrium conditions that encourage diversification and market entry. These types of markets are primary locations for acquisition activity. However, they generate, at any point in time, inconsistencies concerning competitive requirements, institutions and customers, as well as uncertainty over future changes. For international firms, these inconsistencies are further complicated as they apply to cross-border

activities. Businesses operating in these markets typically face high transactions costs as they lack knowledge and information that can reduce uncertainty, while accepting their potential accessibility and attractiveness.

Firms taking advantage of growth opportunities in these markets through acquisitions seek to efficiently allocate investments. They want to add value to the firm, while improving their operations and resources. To most efficiently optimize their investments into growing, transitory markets, we expect acquiring firms to purchase larger degrees of ownership. This enables an acquiring firm to not only tap into the investment returns in these attractive markets, but also take control of the target in regards to future strategies and opportunities and achieve synergies with existing operations. Given rapid market growth, higher ownership and control reduce future uncertainty for the acquiring firm. Based on this argument the following argument is offered:

Hypothesis 2:	The level of ownership of international acquisitions will be positively associated with the degree of industry growth rates.

A third industry factor influencing ownership positions in acquisitions concerns the level of concentration of market power by industry rivals. Industries low in concentration are fragmented by a large number of firms, many privately held and none with a substantial share of total industry sales (Porter, 1985). The primary attribute of a fragmented industry is the absence of market leaders mainly due to a lack of economies of scale, low entry and exit barriers, changing value chain technologies, diverse market demands, and the presence of new products or participants. These industries are typified by changing products, technologies, and customer demands leading to a highly uncertain market environment.

Alternatively, highly concentrated industries contain a small number of firms and are characterized by economies of scale and market power while displaying conditions of oligopolistic interdependence. Typically, due to the size and strength of industry participants, these industries are global in nature with firms coordinating and controlling extensive operations across multiple foreign markets. These firms have built large hierarchies over time to eliminate or reduce transaction costs by internalizing transactions. For participating firms in these industries, it likely that acquisitions will be integrated as fully as possible into the organizational hierarchy through increased ownership positions. Small firms in fragmented industries have not developed the global infrastructure to internalize transaction costs. They do not rely on global coordination and scale to achieve organizational efficiency and will therefore, not be as likely to purchase large degrees of ownership as they expand abroad. Based on this discussion the following hypothesis is offered:

Hypothesis 3:	The level of ownership of international acquisitions will be positively associated with the degree of industry concentration.

While environmental factors do affect strategic choices, a richer perspective views acquisitions as strategic actions that allow firms to modify their competencies and enhance their value as they keep pace with change in the environment (Bowman & Singh, 1990, 1993; Kogut & Zander, 1996; Oliver, 1997). International acquisitions are the result of corporate strategies aimed at applying a successful corporate theme (Porter, 1987). From an economic standpoint, a strategic action is more likely to be efficient and create value when it deploys assets utilizing similar key success factors and value-creating opportunities (Capron, Mitchell, & Swaminathan, 2001). Employing similar or consistent strategies throughout a network of international operations is more efficient and leads to synergies throughout the organization.

Strategic similarity at the corporate level can be found in the pre-existing repertoires of the acquiring firm in its pattern of diversification and allocation of resources throughout its business units. Firms invoking strategic similarity develop related competencies and resources in an attempt to exploit or realize the potential economies and synergies that large size and related diversification can offer.

A type of strategic similarity employed by organizations involves how resources are deployed, namely, investments in research and development (R&D) and marketing across the firm's different businesses. Corporate resources are distributed either evenly or unevenly across different business units based on what yields higher returns or to develop and enhance a common set of competencies. To measure strategic similarity, the emphasis is not on why a certain allocation is made or the intensity of the allocation, but on how similar or dissimilar the allocations are across the corporation.

Similar resource allocations across multiple business units signal involvement in industries that require competitive advantages based on common tactics or they signal an attempt on the part of top management to manage multiple lines of business based on a singular dominant logic (Harrison, Hall, & Nargundkar, 1993). The similarity of resource allocations is evidence that the corporation is emphasizing organizational processes that require a firm to maintain similar strategies throughout its network of business units. This consistency signals the presence of high control processes at work throughout the corporation and results in a tendency to replicate existing organizational features or strategies, especially as firms invest abroad (Rosenzweig & Singh, 1991).

R&D and advertising allocations are of particular importance as they determine a firm's emphasis on innovation or marketing for its competitive advantage. Outlays in these areas are expected to affect a firm's cash flow from both its existing assets and its future investments. If business units do not share a corporate emphasis on innovation or marketing with their siblings, then there is no consistent corporate strategic emphasis in these areas, indicating the use of different strategic approaches for each business unit.

Business units with similar resource patterns indicate high levels of internal consistency and control which in turn increase the ability of the corporation to implement strategies and coordinate activities (Anderson & Gatignon, 1986). Firms with a corporate strategy of allocations of similar

intensity across their business units and their resulting benefits will want to continue this pattern in international acquisitions. Only high ownership positions allow the control necessary for these types of resources. Alternatively, when low levels of ownership are purchased, target firms continue to possess the autonomy necessary to adopt resource deployment patterns unaffected by the norms of other organizational units within the acquiring firm. Based on these arguments the following hypotheses are offered:

Hypothesis 4:	The level of ownership of international acquisitions will be positively associated with the similarity of R&D allocations across acquiring firms' business units.
Hypothesis 5:	The level of ownership of international acquisitions will be positively associated with the similarity of advertising allocations across acquiring firms' business units.

Strategic similarity also facilitates the integration of the target to the acquirer from both a technical and organizational perspective (Ahuja & Katila, 1998; Haspeslagh & Jemison, 1991; Singh & Zollo, 1997). The absorptive capacity argument maintains that the ability to use resources of acquired firms increases when the target firm is related to the firm's existing resources (Cohen & Levinthal, 1990). Acquisitions of firms with similar strategic characteristics such as competition or similar products result in higher scale efficiencies and lower transaction costs than acquisitions involving strategically dissimilar firms (Ramaswamy, 1997).

Therefore, the relatedness of the acquiring firm to the target firm is an extension of existing capabilities in order for the firm to achieve the tangible and intangible benefits of product similarities. In this case, higher degrees of ownership would be more appropriate for firms acquiring related target firms by reducing transaction costs and creating an optimal organizational arrangement. However, if the target firm is not related, then less ownership will be preferred due to the lack of synergies to be exploited and an increased level of uncertainty due to entering a new market. Therefore, the following hypothesis is offered:

Hypothesis 6:	The level of ownership of international acquisitions will be positively associated with the relatedness of the acquiring firm to the target firm.

Strategic similarity creates a shared understanding that facilitates acquisition resource deployment between the target and the acquirer, while dissimilarity reduces the party's contextual knowledge (Capron et al., 2001). Shared understanding arises from common knowledge and industry experiences (Huff, 1982), common repertoires of strategies (Spender, 1987), and common

collective cognitive models and beliefs (Porac, Thomas, Wilson, Paton, & Kanfer, 1995). To this point, the study has argued that these variables are specifically germane to firms crossing national boundaries due to the high level of uncertainty in these environments and the desire for investing firms to reduce transaction costs that arise.

However, international markets differ in the amount of uncertainty and complexity they create for the investing firm. These differences can be found in the distance culturally and economically from an entering firm's home market. In acquisitions, as these differences increase, the dissimilarities between the target and the acquiring firm become greater. In predicting the control an organization is likely to maintain over foreign operations, theorists associate higher distance with higher transaction costs due to information costs and the difficulty of transferring resources (Buckley & Casson, 1976; Vachani, 1991). Dess, Gupta, Hennart, & Hill (1995) suggest that high degrees of geographic diversification create unwanted transactions cost due to the degree of differences between cultures and nations.

A key component of transaction costs theory is that human agents involved in decision-making are characterized by bounded rationality. The implication of the assumption of bounded rationality is that individuals are limited in knowledge, foresight, skill, and time, exchanges will be characterized by adaptive, and sequential decision-making, and trading requires the support of safeguards to shield organizations from opportunistic behavior (Williamson, 1985). Therefore, as the uncertainty associated with greater market distance rises, factors influencing higher levels of control become more important as firms look to create economically efficient organizational arrangements. A reduced understanding of the target's home country by the acquiring firm increases the reliance on common market expectations and strategic repertoires as firms look to make sense of the complexities and intricacies of foreign environments. Therefore, it is expected that the hypothesized relationships described earlier would intensify as market distance increases. In the context of this study, market distance is lower for target countries closer to the United States. Based on this discussion the following hypotheses are offered:

Hypothesis 8:	The association between industry factors and higher degrees of ownership will be stronger in markets with higher distance proximity.
Hypothesis 9:	The association between firm factors and higher degrees of ownership will be stronger in markets with higher distance proximity.

METHODOLOGY

The source of the sample for this study is the Mergers and Acquisitions roster. Acquisitions included in the sample met the following restrictions:

1.	U.S. firms acquiring target firms headquartered in the European Union.
2.	Acquisitions between January 1,1993 and December 31, 1997.
3.	Acquisitions involving the purchase of a target firm as opposed to purchases of assets such as property plant and equipment.
4.	Transactions reporting the degree of ownership exceeding ten percent.
5.	New transactions of acquisitions as opposed to additional share purchases.
6.	Acquisitions by publicly traded U.S. firms.

Measurement of Variables

Degree of ownership is measured using the percentage of ownership purchased reported in Mergers and Acquisitions roster. The measurement of an industry's technological development follows Chan et. al. (1990) by utilizing Business Week's annual R&D scorecard for the year prior to the acquisition. Industries are classified as high, medium or low in technological development and treated as an interval variable. Industry growth rate is measured within the target firm's international industry located in its home country. The data for this variable is obtained from the Eurostat database. The measure captures the percentage change in industry revenues three years prior to the acquisition.

Industry concentration is obtained using the four-firm concentration ratio, a common method for operationalizing the variable (Caves & Mehra, 1986; Chatterjee, 1992). Data is taken for the year of the acquisition from the Census of Manufacturers. The arithmetic average of the concentration ratio is used for acquiring firms active in multiple industries following the method used by Hennart (1991).

The relatedness of the acquiring firm to the target firm is obtained using similarities between 3 digit SIC industries of the target firm and the acquiring firm. If the target belongs to a similar three-digit SIC then it is treated as related; targets belonging to different SIC industry groups are defined as unrelated. This independent variable is tested using a dummy variable. In order to measure the similarity or dispersions in resource allocations across businesses, the study follows Harrison and colleagues (1993) by examining the variance of the intensity of R&D and advertising across each business unit segment of the corporation. Data for these variables are collected from the COMPUSTAT database and annual reports. Acquiring firm size in terms of revenues and prior internationalization are controlled for in the analytical tests.

DATA ANALYSIS AND RESULTS

As the model includes a set of both market and firm strategy variables, hierarchical set regression is used to ascertain the increment in the proportion of variance accounted for by each set and to support the individual hypotheses (Pedhazur, 1982). The Mergers and Acquisition roster reveals in excess of 3,000 mergers and acquisitions of EU targets by U.S. firms during the sample time period. Of these, 948 include some description of the degree of ownership. Upon application of the study requirements, the final sample includes 311 acquisitions. Comparisons on average acquisition price, target firm location, and target firm industry membership indicate that the sample of 311 acquisitions is representative of the larger sample.

Table 1 presents the correlation matrix of the variables in the research model and indicates the strength and significance of the bi-variate associations between each of them. The table reveals several expected or likely associations

Table 1Correlation Matrix

	1	2	3	4	5	6	7	8	9
1. Acquiring Firm Revenues	1.00								
2. Acquiring Firms Internationalization	.12*	1.00							
3. Relatedness of Acquisition	.03	.05	1.00						
4. Similarity of Acq Firm's R&D	- .05	.05	.05	1.00					
5. Similarity of Acq Firm's Advertising	--.14	.21	.06	.02	1.00				
6. Industry Tech Development	- .01	.16**	-.04	.02	-.16	1.00			
7. Industry Growth	- .05	.14*	.21**	.04	.04	-.07	1.00		
8. Industry Concentration	.05	.07	-.08	-.16*	-.07	.14*	-.13	1.00	
9. Degree of Ownership Purchased	- .05	.15**	.31**	.08	-.13	.01	.17*	.18**	1.00

N = 311.
** Correlation is significant at the .01 level (1-tailed).
*.Correlation is significant at the .05 level(1-tailed).

The correlation matrix indicates that several variables (AFINTL, TFREL, INTINDGR, and INDCONC) have significant bi-variate associations with degree of ownership (OWN%).

Hierarchical set regression is used to test the research model and the results are indicated in Table 2. Model 1 in Table 2 includes only the control variables and indicates that the extent of prior internationalization (AFINTL) of the acquiring firm shows a negative significant relationship to degree of ownership.

Table 2: Regression Estimates For Degree of OwnershipTotal sample

	Model 1		Model 2		Model 3		Model 4	
Variables	β	t-ratio	β	t-ratio	β	t-ratio	β	t-ratio
Constant	89.266	50.51	68.846	8.95	111.954	18.42	116.821	5.06
Control Variables								
AF SALES	-1.349E-5	-1.01	-5.646E-5	-.38	-6.770E-4	*-2.59	-3.674E-4	-.83
AF INTL	-15.307	*-2.76	-13.946	-1.90	-14.298	-1.44	-27.006	-1.78
Industry Variables								
INDTCDV	-	-	-.485	-.237	-	-	-3.434	-.80
INTINDGR	-	-	.173	*2.41	-	-	-983 1E-3	-.05
INDCONC	-	-	26.079	***3.51	-	-	13.161	.78
Firm Variables								
TFREL	-	-	-	-	11.328	**2.81	14.824	*2.42
AFR&DINT	-	-	-	-	17.540	.76	-24.279	.74
AFADVINT	-	-	-	-	-54.190	-1.75	-36.098	-.89
Adjusted R^2	*.022		**.086		**.260		.132	
N	311		311		311		311	

* p<.05, ** p<.01, *** p<.001

The second model in Table 2 regresses both the control variables and market variables on the degree of ownership. Hypotheses one, two, and three develop the relationships concerning the influence of market characteristics (level of technological development, international industry growth rates and level of concentration) on the degree of ownership in acquisitions. As this model indicates, support is found for Hypotheses 2 and 3. Both the growth rate of the international target's industry and industry concentration have significant positive relationships with the dependent

variable. Higher growth in the target firm's market and higher industry concentration lead to a higher degree of ownership being purchased. The overall adjusted R2 is significant, explaining 8.6% of the variance of the dependent variable.

The third model is calculated with control variables and firm strategy variables entered respectively. The model indicates that the relatedness of the target firm to the acquiring firm is significant (Hypothesis 6). Other firm variables are not significant, therefore providing no support for hypotheses 4 and 5. Model 3 has a strongly significant adjusted R2 of .26.

Lastly, Model 4 is estimated. This regression model includes the control, industry, and firm strategy variables entered simultaneously. In this last model, only the relatedness of the target firm to the acquiring firm indicates a significant t-ratio. However, the model does not have a significant adjusted R2, indicating that this model does not explain any additional variance beyond Models 1, 2 or 3.

Cultural distance

The initial sample included acquisition targets from a large homogenous political/legal environment in order to control for extraneous national or legal effects on the degree of ownership. Large numbers of acquisitions within the sample are clustered in the United Kingdom, France, and Germany. The sample included 101 acquisitions of U.K. targets, with 74 and 46 in Germany and France respectively. Even though these countries have common tariffs and international trading standards, they are of course very different socially and culturally. Of the three, the U.K. is most culturally similar to the U.S. and is its leading international trading partner. As such, this nation is considered having the least market distance between U.S. markets and business practices.

To investigate the hypothesized relationships in the context of cultural differences between U.S. firms and the individual nations within the European Union, the research model was again tested using these subsets of the overall acquisition sample per nation. The results of the tests run on the three nations are indicated below in Table 3. This test illuminates the strength of the proposed hypotheses (H7 & H8) per each of these three countries.

As the results indicate, all three models had significant adjusted R2's, however they differed somewhat on the predictor variables. For the French and German sample of firms, the common significant predictor was similarity of advertising allocations across business units. This variable indicated a strong negative relationship with degree of ownership. Therefore, when advertising intensity is similar across businesses within the acquisitive firm the degree of ownership purchased would be less. Another finding for the French sample is the importance of industry growth in the French market. The model shows a significant influence on the dependent variable suggesting that higher industry growth in the target market meant higher degrees of ownership by the acquiring American firms.

As for the U. K. sample, different predictor variables indicated significant explanatory power. The regression equation included the relatedness variable as significant to explaining the degree of ownership. Acquiring firms that were related to their targets acquired a greater degree of ownership than unrelated firms is similar to previous results.

Table 3Regression Estimates For Degree of OwnershipFrance, Germany, And U. K. Subsets

	France		Germany		U. K.	
Variables	B	t-ratio	B	t-ratio	B	t-ratio
Constant	97.985	12.25	101.997	14.85	66.700	8.57
-Control Variables						
AF SALES	.251	.85	.025	.09	.177	1.06
AF INTL	.491	1.29	-.433	-1.66	-.105	-.43
-Industry Variables						
INDTCDV	.152	.48	-.187	-.70	-.203	-1.20
INTINDGR	.502	*2.99	-.035	-.13	.194	.94
INDCONC	-.031	-.06	.430	1.92	.020	.09
-Firm Variables						
TFREL	.103	.31	-.008	-.02	34.691	**5.54
AFR&DINT	.099	.32	-.295	-1.21	.013	.064
AFADVINT	-265.					
	631	*-3.18	-683.45	*-2.82	-.043	-.23
Adjusted R^2	*.646		*.411		*.792	
N	47		74		101	

* p<.05, ** p<.01, *** p<.001

DISCUSSION

The results of the data analyses reveal that, indeed, explaining the degree of target firm ownership is a combination of market and firm influences. The study suggests that acquisition ownership is driven in part by environmental influences and strategic similarity between the firms.

The findings neither completely support the industry influences model nor the firm effects. Rather, they reveal that acquisitions and ownership are part of a process of capturing market opportunities and combining knowledge of existing market environments and internal capabilities.

The results concerning hypothesis 1, the level of technological development, suggest that this characteristic is not an important influence on firms concerning the degree of ownership they acquire. Overall, this finding is in contrast with much of the literature maintaining that an industry's technological development is one of the primary drivers of a firm's strategy and structure (Chan, Martin & Kensigner, 1990; Child, 1972). Perhaps the primary issue of acquiring firms investing in these markets is not the degree of the investment, but the fact that a purchase of any degree provides access to new technologies in international markets. Therefore, no ownership pattern emerges for these acquisitions.

In other aspects of the tests of market effects, it appears that industry growth rates are important for an acquiring firm's ownership preferences as indicated in hypothesis 2. U.S. firms purchase high levels of ownership in high growth markets regardless of any risk associated with volatility and change, in order to more capitalize on rapid market growth and reduce transaction costs. Acquisitions are one of the primary choices for corporate growth strategies that allow firms to move rapidly into new markets or areas and receive immediate benefits. With increased uncertainty and inconstancies inherent in these rapidly changing markets, firms utilize high degrees of ownership to structure their acquisitions.

Lastly, in the tests of market effects, the findings support hypothesis 3. The results suggest that U.S. firms belonging to highly concentrated industries purchase more of their targets than firms competing in fragmented industries. Typically, these concentrated industries are characterized by market maturity and stability. Alternatively, fragmented industries provide an environment for firms to undertake a diverse set of strategies. Investing abroad involves inherent uncertainty in determining how to compete in new industries or markets. In developing organizational responses for dealing with the uncertainties associated with international expansion, firms historically relying on market power in concentrated industries are likely to extend similar competencies into new subsidiaries. This meets their need for control required by large, powerful firms for resource allocation and for any post-acquisition realignment in the overall structure of the firm. Therefore, a conformance to pre-existing firm norms brought about by membership in highly concentrated environments may be particularly relevant for firms investing abroad through acquisitions. The overall result of this pattern is an effort by U.S. firms in concentrated markets to retain control through ownership over operations as they expand into newly acquired EU subsidiaries.

The tests of the firm effects model examine the importance of the acquiring firm's strategic similarity in terms of pre-existing relatedness patterns and resource allocations and the relatedness of the acquiring firm and target. The results for these effects are mixed with the variables relating pre-existing strategic patterns as having little importance for explaining the degree of ownership in acquisitions. The lack of support for these hypotheses has many plausible explanations. Perhaps

when a highly related acquiring firm purchases targets in new areas or markets it does not have the existing competencies to warrant high degrees of ownership and control. As such, lower degrees of ownership would be warranted.

In interpreting the results focusing on corporate resource allocation patterns, the evidence suggests little influence of these strategic considerations on the degree of ownership. The findings do not allow us to extend Harrison et al. (1990), who argue that consistency of allocations provide clues as to the dominant logic of the firm and signal high control processes at work throughout the firm. It appears that for firms allocating resources similarly throughout their subsidiaries, the need for consistently applying this strategy does not carryover to its purchase of new subsidiaries by acquiring a high degree of ownership. Perhaps pre-existing patterns of allocating might be more important as influences later in the implementation process and could be an important factor in an acquiring firm increasing its ownership stake. Overall, hypothesis four and five are not supported.

The variable with the strongest significant explanatory power of any in the overall research model is the relatedness of the target firm to the acquiring firm. These results reveal that when acquiring firms are interested in expanding into related areas, then high degrees of ownership are warranted. Based on the theoretical framework, this is a continuation of capabilities developed in the acquiring firm and extended to the target. It is also an opportunity for the acquirer to adapt and change as new ideas and resources are brought into the firm. High degrees of ownership enable these processes within merging firms and provide an economically efficient means for growth. Lastly, purchasing related businesses offset the risk associated with an international acquisition.

Lastly, the sample was split into subgroups consisting of acquisitions located in France, Germany and the U.K. The regression models were rerun to test what, if any differences, market distance had on the hypothesized relationships. Many international researchers have long argued that differences between nations necessitate the need for firms to be locally responsive to individual markets (Dunning, 1980; Kimura, 1989; Rosenzweig & Singh, 1991) even when legal or political considerations are similar. Theoretically, it was argued that as differences in national environments increased, the industry and firm factors driving ownership would have even stronger influences on degree of ownership.

The results are weak concerning hypotheses 7 and 8 as the factors do not appear stronger for the French and German subsets than they do for the U.K. The only factors that do differentiate themselves from the overall model concern advertising allocations and the extent of internal diversification of the acquiring firm. Consistent advertising allocations were not supported in the overall model. In the French and German samples they are not supported either, but are significant in the opposite direction of the hypothesized relationships. This evidence suggests that firms purchasing targets in nations with high market distance from the U.S. are expecting to adapt to their local environments in terms of marketing expenditures. The likelihood that the target will be integrated into the parent organization in this area appears to be, at least initially, offset for the need to be locally responsive in these strategic areas. In this situation, acquiring firms are not acting on

extending similar strategic patterns, but are focusing on gaining market knowledge from other partners until time that shares of ownership will be increased or divested.

As for the U. K. sample, different predictor variables indicate significant explanatory power. The regression equation includes the relatedness variable as significant on the degree of ownership. Acquiring firms that were related to their targets acquired a greater degree of ownership than unrelated firms did. Interestingly, the strategic similarity theory as it applies to diversification relatedness appears stronger for targets located in the U.K. than for the French and German samples. Perhaps U.S. firms are more confident of extending their capabilities in U.K. firms with similar cultural proximity and therefore, purchase large degrees of ownership.

For an indication of the relative strength of the market and firm strategy effects, the results indicate that strategic considerations provide more explanatory power than industry influences. This difference is expressed in the percent of explained variance indicated in the adjusted R2 between the two main research models (2 and 3) in Table 2. Interestingly, more variables are significant in the industry effects model, but the model's overall predictive power is weaker. This result appears to be due to the importance of the relatedness of the target firm to the acquiring firm.

The two sets of market and strategy influences appear to lack any complementary or additive effects on the degree of ownership as expected in the research model. Instead, they appear to offset each other's explanatory power. For example, the explained variance of degree of ownership is not significant when the two sets are input simultaneously in regression Model 4. The significant industry variables, concentration and international growth, become inconsequential and even negative in their relationship with ownership, while the overall model is not significant in explaining any variance. Also, only the relatedness of the target firm to the acquiring firm is significant to the degree of ownership in Model 4.

Conclusions from these results indicate that the most predictable effects stem from the relatedness of the target firm to the acquirer, the growth rate of the target's international market and industry concentration level. Overall, the set of strategic choice variables is strongest in its explanatory power of degree of ownership. The complementary nature of these sets of predictors is not supported. The results do suggest that strategic similarity and environmental considerations are important for ownership choices.

As with any research, there are limitations to the study. While, efforts were made to minimize these limitations, some remain and must be stated. One issue concerns the inherent nature of cross-sectional designs. While this type of research design has the ability to describe features of large numbers of organizations, it is difficult to eliminate all factors that could possibly cause the observed correlation. The study attempted to control for these, but obviously many other factors could be suggested as important influences on the degree of ownership purchased of international acquisitions.

Another limitation of this research is the focus on acquisitions made in European Union nations. The findings of the study may not be generalizable to acquisitions made in other countries.

Also, the study includes only acquisitions during the time frame of 1992-1997. The decade of the 1990's was an era of great change and discontinuity in the EU as new laws passed, Eastern European nations integrated into the West, and monetary and regulatory unification between the member nations continued. Obviously, with such change, one has to acknowledge that existing patterns and actions of firms during this period may not be the replicable in other time periods.

The results suggest that acquisitive U.S. firms investing in the E.U. tend to purchase higher levels of ownership if the firm is strategically similar to its current line of business, regardless of previous international experience, size of the firm, or industry characteristics. With high control via ownership, it may still be necessary to be locally responsive with corporate resource allocations. The evidence also suggests that U.S. firms in highly concentrated domestic industries purchase a higher degree of ownership of international acquisitions than firms participating in more fragmented industries. Overall, when making decisions about acquisitions, it appears that fitting the target to the acquiring firm may be of more importance to decision-makers than industry considerations.

From an investigation of this topic, questions emerge that generate areas for further research. One primary issue lies in determining the relationship of the degree of ownership with the performance of acquisitions. The performance - ownership linkage could be examined using market measures at the time of the purchase or the subsidiaries performance following the purchase. Lastly, an investigation of the different levels of ownership and control and their impact on the implementation of the acquisitions would be appropriate. Linking performance to the issue of degree of ownership would provide meaningful information in the areas of structure and implementation, providing data for firms on the most beneficial method for structuring acquisitions at their inception.

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THE RELATION BETWEEN GROWTH AND INFLATION RATES IN LATIN AMERICA

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ABSTRACT

Inflation has long been a problem for countries in Latin America. While some countries have made progress in addressing the problem, other countries have not been able to achieve sustained economic growth. Keynesian thought posits the notion that inflation and growth can be positively related, while other theories suggest that inflation is detrimental to long-run growth. Various empirical studies yield conflicting results. This study applies two Granger causality tests to seventeen Latin American countries in order to determine possible long-run relations. For most of the countries, no causality is found, while unidirectional causality and bi-directional causality is found in a limited number of countries.

INTRODUCTION

Historically, many Latin American countries have been plagued by inflation problems though the problem has not been universally severe. During the past few decades, some of the countries have made considerable progress toward controlling inflation while others still struggle in the battle against inflation. Some countries in the region have also encountered difficulties in maintaining respectable economic growth rates. The purpose of this paper is to explore the relations that appear to exist between inflation and economic growth in selected Latin American countries and to note some of the econometric problems that exist in analyses of this nature.

There is far from universal agreement regarding the relation between inflation and economic growth, and this relation has long held a central position in macroeconomics. The traditional Keynesian view would hold that inflation can act as a stimulus to economic growth. This view is typically expressed through a short run Phillips curve tradeoff (Paul, Kearney & Chowdhury, 1997) that arises due to sticky prices and wages. Thus, in the short run, faster real growth may be associated with inflation (Motley, 1998). However, the Phillips curve tradeoff tends to disappear as economic agents are able to anticipate price changes. These views were especially prominent in the 1960's and continued into the 1980's (Bruno & Easterly, 1996).

There are strong arguments that inflation is detrimental to economic growth, especially in the long run. Inflation makes it difficult for economic agents to make correct decisions since

changes in relative prices become obscured (Harberger, 1998). Inflation imposes variable costs, especially menu costs. If inflation is high, the variability of inflation may also be high and this complicates the task of forecasting inflation. If inflation cannot be correctly anticipated, both savers and investors may be lead to make decisions that are detrimental to economic growth. This view is traditional and, in spite of the Keynesian views promulgated in the 1960's and thereafter, this view is incorporated into models of the new-growth literature (Bruno & Easterly, 1996).

The empirical evidence regarding the inflation-growth relation is mixed. Fischer (1993) found that real GDP growth is negatively related to inflation in cross sectional regressions and that low inflation is not necessary for growth. Using extreme bounds analysis, Levine and Zervos (1993) found that there is not a significant negative correlation between growth and inflation. They suggest that if inflation persists over a long time period, economic agents find mechanisms to adjust so that growth is not affected. However, cross-country regressions involving socio-economic variables often produce fragile results (Levine & Renelt, 1992).

Grier and Tullock (1989) found that the average level of inflation had a neutral effect on growth in the OECD countries but for the remainder of the world, inflation had a significant negative effect on growth. For Latin America, they found no statistical relation between inflation and growth. Barro (1997), in a world wide cross sectional analysis, found a negative relation between inflation and growth, though the effect could not be isolated for inflation rates below 20 percent. Other research by Barro (1996) indicates that the experiences of high inflation have adverse effects on investment and growth. Kocherlakota (1996) supports Barro's findings of a negative slope coefficient between growth and inflation and further shows that high growth tends to generate low inflation.

Until the 1970's, many studies found the negative effect of inflation on economic growth to be statistically insignificant, and in some instances, the effect was found to be positive (Sarel, 1996). The high and persistent inflation rates experienced by some countries during the 1970's and 1980's brought about a rethinking of the inflation-growth link.

The preceding review of cross-sectional studies, while not exhaustive, does not provide clear evidence of the growth-inflation relation. There are numerous problems associated with the use of cross-country regression analysis. Levine and Renalt (1992) and Temple (1999) review some of the methodological problems. Pooled cross-country data sets tend not to be informative regarding what happens in the lower ranges of inflation (Bruno & Easterly, 1998). The empirical relation between growth and inflation appears to be different for Africa and Latin America (Ericsson, Irons & Tryon, 2001).

Time series analysis, which does have the advantage of unmasking relations for individual countries, has yet to provide evidence of a universal relation between growth and inflation. Paul, Kearney, and Chowdhury (1997) performed Granger causality tests on 70 countries for the 1960-1989 time period. For 40 percent of the countries, no causality was found; for approximately one-third of the countries, unidirectional causality was found; and for approximately one-fifth of the

countries, bidirectional causality was found. In 19 of the countries, the direction of causality ran from growth to inflation, while the direction ran from inflation to growth for seven countries.

In this analysis, the correlation between the growth and inflation rates for each of the 17 Latin American countries is examined. Then the data are subjected to Granger causality tests in order to determine if long run relations exist and to determine the direction of causality. The data cover the 40-year period from 1961 through 2000.

DATA

Annual data used for the 17 Latin American countries were extracted from the World Bank's World Development Indicators: 2002 (cd-rom version). Annual inflation rates reflect annual percent changes in the CPI. Changes in the CPI are used in place of the GDP deflator since, by construction, the GDP deflators are negatively correlated with growth rates (Sarel, 1996). For this study, economic growth rates are defined as annual percent changes in real GDP. The countries included in the study are those Latin American countries for which 40 years of annual CPI and GDP growth rates could be obtained.

As a first step in analyzing the growth-inflation relation, the simple correlation coefficients between the annual percentage increases in the real GDP growth rate and the CPI were examined for the each country, and those correlation coefficients appear in Table 1. Only two countries, Paraguay and Uruguay, have positive coefficients, and in both cases, the resulting p-values are extremely large. Only two of the countries, Costa Rica and Mexico, had reasonably high coefficients, and in both instances, the level of significance is quite high.

Table 1: Growth-Inflation Correlations, By Country, 1961-2000

Country	Correlation Coefficient	p-value
Argentina	-0.40	0.01
Bolivia	-0.21	0.19
Columbia	-0.18	0.27
Costa Rica	-0.69	0.00
Dominican Republic	-0.26	0.11
El Salvador	-0.36	0.02
Guatemala	-0.21	0.20
Haiti	-0.18	0.26
Honduras	-0.30	0.06

Table 1: Growth-Inflation Correlations, By Country, 1961-2000		
Country	Correlation Coefficient	p-value
Jamaica	-0.19	0.24
Mexico	-0.60	0.00
Panama	-0.08	0.63
Paraguay	0.13	0.41
Peru	-0.45	0.00
Trinidad & Tobago	-0.00	0.98
Uruguay	0.15	0.35
Venezuela	-0.26	0.10

Table 2: Mean Growth And Inflation Rates		
Country	Mean Growth Rate	Mean Inflation Rate
Argentina	2.59	242.90
Bolivia	2.74	353.78
Columbia	4.23	19.25
Costa Rica	4.87	14.18
Dominican Republic	5.43	11.95
El Salvador	3.10	9.78
Guatemala	4.05	9.22
Haiti	.95	10.32
Honduras	3.99	8.57
Jamaica	1.95	16.16
Mexico	4.72	26.83
Panama	4.54	2.85
Paraguay	4.52	13.09
Peru	3.14	331.25
Trinidad & Tobago	3.75	8.18

Table 2: Mean Growth And Inflation Rates		
Country	Mean Growth Rate	Mean Inflation Rate
Uruguay	1.93	53.12
Venezuela	2.72	17.01

Table 2 shows the mean growth and inflation rates for the 17 countries. These rates are the simple arithmetic average rates for the 40-year time period. Only three of the 17 countries had average growth rates below two percent, and seven countries had average growth rates in excess of four percent.

Three of the countries (Argentina, Bolivia, and Peru) had triple-digit average inflation rates. Argentina experienced triple-digit inflation in 15 of the 40 study years. Bolivia only had that experience for three of the 40 years, but in one year the inflation rate was in the 5-digit range. Panama had the lowest average inflation rate, but its economy has been dollarized for quite some time.

The correlation coefficients indicate that, for 15 of the 17 countries, a possible negative relation exists between growth and inflation, while a positive relation could exist for two of the countries. However, the preceding correlation analysis indicates nothing about the direction of causality. Furthermore, well-known difficulties with time series analysis may be present. If the data are nonstationary, then the results found may be spurious (Murray, 1994).

METHODOLOGY

In order to gain insight into the direction of causality between inflation and growth, two causality techniques will be used. While no statistical test can indicate true causality, inference can be made as to which variable may precede another variable.

The first technique is the test for Granger causality (Granger, 1969). With Granger causality, to determine if growth (Y) "Granger causes" inflation (P), the following two regression equations are estimated:

$$P_t = \alpha + \sum_{i=1}^{m} \beta_i P_{t-i} + e_t \qquad (1)$$

$$P_t = \alpha + \sum_{i=1}^{m} \phi_i P_{t-i} + \sum_{i=1}^{n} \delta_i Y_{t-i} + u_t \qquad (2)$$

The first equation is the current inflation values regressed on lagged values of inflation. The second equation adds lagged values of growth to determine if past values of growth assist in the prediction of current values of inflation. An F-test is then used to determine whether the coefficients of the lagged growth rates in the second equation may be considered to be zero. To test for causation from inflation to growth, the test is repeated where growth is regressed on past values of growth and then compared to the regression of current values of growth regressed on past values of growth and inflation. The direction of causation between growth and inflation can be one of four possibilities: inflation to growth, growth to inflation, bidirectional between growth and inflation, or no relationship between growth and inflation.

The second technique used to investigate the direction of causality is the method used by Paul, Kearney, and Chowdhury (1997). This variation of the Granger causality model allows for "instantaneous causality" by allowing current values of inflation to play a role in determining current values of growth and vice versa. The authors consider this to be advantageous for annual data due to the speed with which information is transmitted through an economy. The model used in this paper differs slightly from the one suggested in Paul, Kearney, and Chowdhury (1997). Paul, et. al., includes the growth rate of money as a possible determinant of inflation. This paper excludes this variable since the focus is on the relationship between inflation and growth only. The following models will be used to further test for causality. For these models, the significance of the coefficients will be used to determine the direction of causality.

$$P_t = \alpha + \sum_{i=1}^{l} \phi_i P_{t-i} + \sum_{i=0}^{p} \gamma Y_{t-i} + v_t \tag{3}$$

$$Y_t = \alpha + \sum_{i=1}^{q} \lambda_i Y_{t-i} + \sum_{i=0}^{r} \eta_i P_{t-i} + z_t \tag{4}$$

RESULTS

Before proceeding with the causality tests, it is important to determine the order of integration of the data. Estimation of the equations requires the use of stationary data. If both growth and inflation rates are nonstationary, cointegration tests are a more appropriate technique to discern long-run relationships and Granger causality. Dickey-Fuller (1979, 1981) and Phillips-Perron (1988) Unit Root tests are two commonly used techniques to determine whether or not time series is stationary. More than one test is typically used due to the low power of the tests. If the tests confirm one another, greater confidence can be placed in the results (Enders, 1995).

Table 3 reports the results of the unit root tests. The lag length was selected using Akaike Information Criterion (AIC). After selecting the lag length, the selection of appropriate model is addressed. The choice for the models includes a time trend and constant, a constant, or no time trend

or constant (none). The power of unit root tests is very sensitive to the deterministic regressors selected. The models were selected using the technique outlined by Doldado, Jenkinson, and Sosvilla-Rivero (1995). The null hypothesis of the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test is the time series contains a unit root or integrated of order one. Failure to reject the null means the series is integrated of order one, I(1), or higher while rejecting the null means the series is stationary or integrated of order zero, I(0).

The five-percent MacKinnon Critical Values for both the ADF and PP test statistic for a lag of zero and no constant or time trend is -1.96. Since most of the models fit this description the reader is referred to MacKinnon (1991) for other critical values.

Table 3: Unit Root Test Results For Growth And Inflation Rates

Country	Var.	Lag	Model	ADF	PP	Conclusion
Argentina	Y	0	None	-4.83	-4.83	I(0)
	P	1	None	-3.69	-3.29	I(0)
Bolivia	Y	0	None	-3.34	-3.34	I(0)
	P	0	None	-5.39	-5.39	I(0)
Columbia	Y	0	Constant	-3.65	-3.65	I(0)
	P	0	Constant	-2.75	-2.75	I(1)
Costa Rica	Y	0	Constant	-4.50	-4.50	I(0)
	P	0	Constant	-1.75	-1.75	I(1)
Dominican Republic	Y	0	Constant	-6.14	-6.14	I(0)
	P	0	None	-1.26	-1.26	I(1)
El Salvador	Y	1	None	-2.49	-2.14	I(0)
	P	0	None	-1.20	-1.20	I(1)
Guatemala	Y	0	None	-1.63	-1.63	I(1)
	P	0	None	-2.14	-2.14	I(0)
Haiti	Y	1	None	-3.40	-6.36	I(0)
	P	0	None	-1.76	-1.76	I(1)
Honduras	Y	0	Constant	-4.75	-4.75	I(0)
	P	0	None	-1.14	-1.14	I(1)

Table 3: Unit Root Test Results For Growth And Inflation Rates

Country	Var.	Lag	Model	ADF	PP	Conclusion
Jamaica	Y	1	None	-2.43	-4.01	I(0)
	P	0	None	-0.95	-0.95	I(1)
Mexico	Y	0	Constant	-4.12	-4.12	I(0)
	P	2	None	-1.08	-1.58	I(1)
Panama	Y	1	Constant	-3.95	-4.13	I(0)
	P	0	None	-1.05	-1.05	I(1)
Paraguay	Y	0	None	-2.12	-2.12	I(0)
	P	0	None	-1.63	-1.63	I(1)
Peru	Y	1	None	-3.43	-3.54	I(0)
	P	0	None	-1.22	-1.22	I(1)
Trinidad & Tobago	Y	1	None	-1.82	-4.06	I(0)
	P	0	None	-1.13	-1.13	I(1)
Uruguay	Y	2	Constant	-4.73	-3.96	I(0)
	P	0	None	-1.31	-1.31	I(1)
Venezuela	Y	0	Constant	-5.53	-5.53	I(0)
	P	4	None	-1.41	-1.82	I(1)

The ADF and PP test gave conflicting results for the growth rate for Trinidad & Tobago. In this case, the order of integration was determined by the PP test. The reason for favoring the PP test is due to the assumptions required for both tests. The ADF test assumes the error terms are independent with a constant variance. The PP test assumes the error terms are weakly dependent and heterogeneously distributed. Due to the nature of the data, the assumptions for the PP test are more reasonable than the ADF test.

For the growth rate variables, sixteen are stationary and one is nonstationary. For the inflation variables, three are stationary and fourteen are nonstationary. When the null hypothesis of a unit root is not rejected, this means the time series could be integrated of order one or higher. For the growth and inflation rates that were found to be nonstationary, these variables were checked for higher orders of integration. While the results are not reported here, it can be concluded that the nonstationary variables are integrated of order one. For the variables having unit roots, the first difference of the variable is used in the estimation of the causality regressions.

Table 4 reports the results of the Granger Causality Tests as discussed in the methodology section. A lag length of two was chosen for the tests. These results should be interpreted with caution due to the nonnormality and/or heteroscedasticity of the error terms. At the ten percent level of significance, it appears the growth precedes inflation in Columbia, Honduras, and Venezuela. Inflation precedes growth in Haiti. There is no detection of bidirectional causality between inflation and growth for any of the countries using this technique. The statistical evidence indicates that for the majority of the countries (Argentina, Bolivia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Jamaica, Mexico, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay) there is no causal relationship between growth and inflation.

Table 4: Results Of Granger-Causality Test

Country	Ho: Inflation does not Cause Inflation		Ho: Growth does not Cause Inflation	
	F-Value	p-Value	F-Value	p-Value
Argentina	2.39	0.11	0.17	0.85
Bolivia	0.69	0.51	2.11	0.14
Columbia	0.52	0.60	4.53	0.02
Costa Rica	1.01	0.38	0.96	0.39
Dominican Republic	0.04	0.96	0.99	0.38
El Salvador	0.95	0.40	0.06	0.94
Guatemala	0.44	0.65	0.73	0.49
Haiti	2.69	0.08	0.10	0.91
Honduras	1.28	0.29	2.49	0.10
Jamaica	1.12	0.34	0.52	0.60
Mexico	0.34	0.71	0.63	0.54
Panama	1.30	0.29	0.85	0.44
Paraguay	1.40	0.26	0.54	0.59
Peru	0.63	0.54	2.09	0.14
Trinidad & Tobago	2.24	0.12	0.32	0.73
Uruguay	1.15	0.33	2.26	0.12
Venezuela	1.27	0.29	4.80	0.02

Table 5 reports the results of the Paul, Kearney, and Chowdhury (1997) alternative variation of the Granger causality test. This model allows for instantaneous causality between growth and inflation. The previous model only allowed for a lagged relationship. To expedite the reporting of the results, only the countries where a statistically significant relationship is evidenced will be given in Table 5. The table reports the regression coefficients and the p-values. As stated before, these results should be interpreted with caution due to the violation of assumptions concerning the error term. Where applicable, the regression results have been corrected for heteroscedasitcity.

Table 5: Alternative Granger Causality Test

Inflation Model (Equation 3)							
Country	α	P_{t-1}	P_{t-2}	Y_t	Y_{t-1}	Y_{t-2}	Adj R^2
Argentina	343.61	0.546	-0.197	-42.307	-7.579	-16.883	0.41
	(0.01)	(0.00)	(0.26)	(0.01)	(0.64)	(0.30)	
Costa Rica	2.716	-0.243	-0.086	-2.578	0.967	1.086	0.33
	(0.73)	(0.18)	(0.68)	(0.10)	(0.14)	(0.22)	
Honduras	-3.044	0.045	-0.112	-0.611	0.748	0.490	0.12
	(0.27)	(0.83)	(0.59)	(0.15)	(0.09)	(0.28)	
Mexico	1.099	0.083	-0.323	-2.317	0.892	1.236	0.26
	(0.88)	(0.67)	(0.34)	(0.00)	(0.45)	(0.20)	
Venezuela	-6.702	0.412	0.476	-2.543	3.438	0.317	0.33
	(0.20)	(0.12)	(0.07)	(0.00)	(0.00)	(0.76)	
Growth Model (Equation 4)							
Country	α	Y_{t-1}	Y_{t-2}	P_t	P_{t-1}	P_{t-2}	Adj R^2
Argentina	3.926	-0.049	-0.256	-0.004	0.000	0.002	0.26
	(0.00)	(0.77)	(0.12)	(0.01)	(0.89)	(0.20)	
Costa Rica	2.361	0.410	0.111	-0.125	-0.052	0.021	0.39
	(0.03)	(0.04)	(0.54)	(0.00)	(0.19)	(0.55)	

Haiti	0.786	0.093	0.130	-0.034	0.025	-0.178	0.05
	(0.29)	(0.57)	(0.41)	(0.68)	(0.78)	(0.05)	
Venezuela	0.894	0.409	0.072	-0.086	0.081	0.090	0.17
	(0.36)	(0.05)	(0.71)	(0.01)	(0.10)	(0.06)	
Note: Parameter estimates with p-values in parenthesis.							

Using this alternative model, growth "causes" inflation in Honduras and Mexico. Inflation "causes" growth in Haiti. There is a bidirectional relationship for Argentina, Costa Rica, and Venezuela. There was no relationship between growth and inflation for Bolivia, Columbia, Dominican Republic, El Salvador, Guatemala, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay. Table 6 provides a summary of the causality tests. More relationships are detected between inflation and growth rates when instantaneous causality is included in the model.

Table 6: Summary Of Results

Granger Causality Test			
Y⇒P	P ⇒Y	Y⇔ P	No Causality
Columbia	Haiti	None	Argentina
Honduras			Bolivia
Venezuela			Costa Rica
			Dominican Republic
			El Salvador
			Guatemala
			Jamaica
			Mexico
			Panama
			Paraguay
			Peru
			Trinidad & Tobago
			Uruguay

Table 6: Summary Of Results			
Alternative Test for Granger Causality			
Y⇒ P	P ⇒ Y	Y ⇔ P	No Causality
Honduras	Haiti	Argentina	Bolivia
Mexico		Costa Rica	Columbia
		Venezuela	Dominican Republic
			El Salvador
			Guatemala
			Jamaica
			Panama
			Paraguay
			Peru
			Trinidad & Tobago
			Uruguay

CONCLUSION

This study has explored the possible relationship between real GDP growth and the rate of inflation, as measured through the GDP deflator, in Latin America over the period of 1961 to 2000. In addition to correlation analysis, Granger causality is used to investigate the nature of the relationship between growth and inflation rates.

The correlation analysis revealed mixed results. For countries where the correlation coefficient is statistically significant, the relationship between growth and the rate of inflation is negative. However there are two possible problems with this analysis. First, the correlation analysis does not indicate the causal flow of the relationship. Is growth having a negative impact on inflation or vice versa? Second, this analysis may yield spurious results if the data is nonstationary.

Unit root analysis is conducted prior to the estimating the Granger causality models. In the cases where the variable is determined to be nonstationary, the variable is first differenced prior to the estimation of the Granger causality models. Two forms of Granger causality tests are conducted. The interpretation of these results should be treated with caution since, due to the nature of the data, the regression models tend to experience violation of the assumptions about the error terms.

For the seventeen countries under study, there was no statistical evidence of a relationship between growth and inflation in eleven countries (Bolivia, Columbia, Dominican Republic, El

Salvador, Guatemala, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, and Uruguay) using the Paul, Kearney and Chowdhury (1997) variation of the Granger causality test. In these countries, economic growth and inflation are not statistically linked. In Haiti where inflation tends to "cause" growth, the preponderance of the evidence indicate an adverse relationship between inflation and growth. For this country, increases in inflation may lead to decreased economic growth. In Honduras and Mexico where growth "causes" inflation, the negative relationship is more beneficial for the economy. For these countries, as the economy experiences positive growth, this tends to decrease inflation. Argentina, Costa Rica, and Venezuela have more complicated relationships between inflation and growth. Growth and inflation appear to have bidirectional causality.

For the Latin American countries used in Paul, Kearney, and Chowdhury (1997), fifteen (Bolivia, Columbia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Panama, Paraguay, Peru, Trinidad & Tobago, Uruguay, and Venezuela) of the countries are also used in this study. For these fifteen countries, the same general conclusion was reached about causality for Costa Rica ($Y \Leftrightarrow P$) and Honduras ($Y \Rightarrow P$). Also, both studies conclude that there is no statistical evidence of causality between growth and inflation for El Salvador, Guatemala, Jamaica, Paraguay, Trinidad & Tobago, and Uruguay. While this study differs in the model (see endnote 1) and the time period used, the studies reach similar conclusions for eight of the fifteen countries. However, the fragility of the results of statistical analysis indicates a need for continual analysis and model development.

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