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The International Pricing of Risk: An Empirical Investigation of the World Capital Market Structure

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Abstract: *This study looks at how much benefit comes from investing in different industries in different countries. Two recent papers by Roll (1992) and Heston Roanhorse (1994) have studied this problem, but they have discovered different results. With a new database called the Dow Jones World Stock Index, we thoroughly analyze the reasons for changes in countries and industries. The index covers 25 countries and 66 different industries. We found out that the type of industries in a country does not have a big impact on the changes in their stock market value. We also find differences in how much of the changes in industry index returns can be explained by the country and industry factors. We will talk about what this means for strategies to spread out investment globally. This text was published in 1998 by Elsevier Science S. a All rights are claimed for this work and are not available for use by others.*

Keywords: *Risk, industrial structure, international financial markets, and diversification.*

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Introduction

Understanding the reasons why stock returns in different countries move together has been a difficult task for both researchers and professional investors. Early studies conducted by Grubel (1968), Levy and Sarna (1970), and Solnit (1974) show that index returns in different countries are not strongly related to each other. These studies also suggest that the advantages of spreading investments internationally are greater than the various expenses involved. These expenses include higher costs for buying and selling investments, differences in regulations and cultures, and risks associated with currencies and politics. However, it is not clear how these benefits from spreading out investments happen. Many experts believe that the gains come from the variety of economic situations in other countries, which are caused by differences in government policies, changes in interest rates, amounts

of debt, and rates of economic growth. Some people suggest that the advantages of international diversification mostly come from the differences in how industries are set up in different countries. Can a US investor get similar advantages by investing in Indonesian stocks if they have a portfolio that is mostly made up of oil and rubber stocks. Do US investors get the same benefits frominvesting in foreign oil stocks as they do from investing in overseas banking or real estate stocks, if they already have a lot of US oil stocks.

In 1974, Lessard first realized that the types of industries in different countries can affect how much their stock market goes up or down. However, new research papers by Roll (1992) and Heston and Roanhorse (1994) have brought back the topic. Roll proposes that three widespread factors contribute to changes in a country's index portfolio returns. First, the way we make the indexes for different countries can result in some being big and spread out, while others are not. Secondly, the way industries are represented in an indexcan help understand why there may be some differences or changes. Both the actual and the stated exchangerates affect the changes in index returns, which are measured in a common currency. Roll examined data from April 1988 to March 1991 for 24 country indexes. From this data, they discovered that about 40% of the fluctuations in stock returns can be attributed to industry factors, while around 23% can be attributed to changes in exchange rates. The job does not involve analyzing the performance of individual stocks, industries, or country-level stock market indexes. He thinks that the returns from each country can be explained by seven industry factors and a separate error that is not influenced by other countries. He uses Fame and MacBeth's (1973) analyses to guess the industry factors. Heston and Roanhorse disagreed with Roll's method because they found that it included the effects of different countries, which means that it exaggerated the importance of the industry effects. They used a different sample and time period to show this. They studied the monthly profits of stocks in seven types of businesses and 12 European countries from 1978 to 1992. They found that less than 1% of the differences in how unstable a country's stock market is can be explained by the types of businesses in that country. They copy Roll's methods to demonstrate how their industry portfolios can also have misleadingly negative connections.

Our research paper looks again at how the differences between countries and industries influence the returns on investments around the world, and how this can impact strategies for diversifying a global portfolio. We use a new database called the Dow Jones World Stock Index. It has daily prices for 66 types of industries and more than 25 countries. We looked at data from January 1992 to April 1995. The books titled (1989), Roll (1992), and Heston and Roanhorse (1994) will be rewritten using simpler words. We are looking at how different countries and industries perform by studying nine broad industry sectors and the more specific industry categories listed in the Dow Jones World Stock Index. Both data sets show that Heston and Grootendorst’s discovery is true, which is that a small amount (less than 4%) of the changes in country indexes can be explained by the industries they have. With the more detailed categories for industries, we can also find some interesting differences in the fluctuations of industry effects for industry indexes. For industries that do not export products (called 'nontraded-goods industries') like media, heavy construction, plantations, conglomerates, and real estate, factors specific to the country they are located in have a bigger impact on the variation in index returns. Industries that make things like cars, computers, office supplies, medicine, and computer chips and sell them around the world have more differences between them. We talk about the important effects of these differences between groups.

The rest of the paper is sorted out in the following way. Section 3 explains how we did our research and Section 4 shows what we found. In Section 5, we talk about how the economy is affected and in Section 6, we give a brief overview.

The Dow Jones World Stock Index data

The Dow Jones World Stock Index was created in 1993 to help global investors by giving them information about 66 different industries and 45 more specific sub-industries across 25 countries. The coverage starts on December 31, 1991, and we use the information from each day until April 1, 1995. Dow Jones categorizes companies based on what they do and how much money they make,

and puts them in groups accordingly. Companies that work in more than one area are sorted based on how much money they make in each area. These rules apply to all companies worldwide. They also check for problems using measures of how easily money can be exchanged, foreign access regulations, the ability to convert currency, and different types of stocks. Every day, the Wall Street Journal shares information about the Dow Jones World Stock Index (Dow Jones and Company, 1993).

Characteristics of the data

Our data covers various industries, enabling us to analyze the influence of both the particular industry and the country of operation. Roll (1992) and Heston and Roanhorse (1994) both divided their securities into only seven industry categories. Broad industry classifications might not have enough differences in returns between industries to tell if the variation is caused by the country or the industry itself. This means that if these groups are used for tests, the results might not accurately show any effects on the industry. On the other hand, when studying US data across different industries, researchers usually categorize them using two or three-digit codes called SIC. These codes have around 62 different industry categories, even at the two-digit level. Using fewer industry categories can lead to additional difficulties when attempting to classify companies from different countries, as they are more prone to possess distinct characteristics.

The Dow Jones World Stock Index covers many countries in a comprehensive way. Heston and Roanhorse studied 829 stocks from 12 European countries, while the Dow Jones World Stock Index includes industry indexes based on the value of over 2400 stocks from 25 countries. International investors can invest in stocks from countries other than Europe. By analyzing this, we can have a better idea of the advantages that come from diversifying investments internationally, based on specific countries or industries.

There are pros and cons associated with the utilization of the Dow Jones World Stock Index data. The data is only available for a short time period (1992—1995) and is only provided on a daily and weekly basis. By utilizing daily data, we conduct a comparative analysis with Roll's (1992) study. Roll utilized a collection of indicators known as the 'FT Actuaries/Goldman Sachs International Indices' which were made available in the London Financial Times. These indices covered 24 different countries and the data was collected from March 1988 to April 1991.

The Dow Jones World Stock Index shows the daily prices of different industries and countries in one place. It includes price indexes for each industry and an overall price index for each country. In simpler terms, having a longer time period would help us analyze the effects of countries and industries better because we could calculate the covariances more accurately. However, the patterns of covariances in global equity market returns change over time. Many studies have found that the way economies and stock markets work together has changed in the last 20 years. This happened because rules about moving money out of a country, taxes on investing in other countries, and other barriers to investing have become less strict.

Moreover, due to more trading between countries, their economies and business profits will likely have stronger connections, causing less variation and stronger relationships between stock returns. However, while overall global stock-return connections may have increased, the importance of specific industries and countries may not have changed because the sizes of companies in the market can change and new ones can enter while others leave. In simple words: In short, using high-frequency returns can make the data more accurate when looking at a smaller time period. However, the differences in trading hours across markets can make the data less reliable when the time period is even smaller. Because international markets trade at different times, studying how industries are affected by looking at one-day returns based on the calendar day can result in incorrect conclusions about the level of similarity in returns. For instance, imagine a global news announcement that affects the steel industry in the US and Japan in a similar way and leads to a stronger positive connection between the two industries. When we use the returns of one trading day, we can see how the US and Japan steel industry stock returns are related on that day. However, we will not take into

account how the performance of US stocks can affect the returns in Japan on the following day. The US market trades later compared to many other markets, while the Japanese market trades early. The paper written by Hamano and his colleagues. In 1990, Lin and colleagues conducted a study. In 1994, a group of researchers led by King conducted a study. In 1994, Bae and Karolyi conducted a study about return correlations using high- frequency data. In 1995, Karolyi and Stolz also conducted a similar study. They found that by using daily data, they were able to capture half of the variation specific to the industry. Using weekly returns alone is not enough to solve this problem because it disregards important fluctuations in the relationships between different returns over time. In our analysis, we only look at the returns measured on a weekly basis. However, we also consider how our findings may change if we looked at the returns on a daily basis instead.

Table 1 displays information about how indexes are distributed among different countries and industries. Some smaller countries are not included in many industries as shown in Panel A. The US is involved in 64 different types of industries, whereas Norway, Finland, Ireland, and Mexico are only involved in less than ten types of industries. Table 1, Panel B displays how many countries are included in a specific industry classification and how many industries are present in each country. More than half of the 66 industry groups are present in at least 9 countries.

Table 1: Coverage of Indexes Across Countries and Industries

	Panel A	**Panel B**
Country	Number of Industries	Number of Countries with Representation
United States	64	N/A (Not specified in the provided information)
Norway	<10	N/A (Not specified in the provided information)
Finland	<10	N/A (Not specified in the provided information)
Ireland	<10	N/A (Not specified in the provided information)
Mexico	<10	N/A (Not specified in the provided information)
Other Countries	N/A (Not specified in theprovided information)	9 or more countries (More than half of the 66industry groupings)

The data presented in Table 1 represents the industries and countries included in the Dow Jones World StockIndex.

Only a few types of businesses are present in each country. Panel A displays the count of industries in each country, indicated by the number of companies involved. Panel B presents the count of countries representedin each industry, categorized by a code that represents the type of economy. For example, B stands for Basic,C for Consumer Cyclical, N for Consumer Non-cyclical, E for Energy, F for Finance, I for Independent, D for Industrial, T for Technology, and U for Utilities. The industries that exchange goods with each other, asdefined by Bodnar and Gentry (1993), are marked with a 'T' next to their name in Panel B.

Panel A Country	No. of Indust.	Country	No. of Indust.	Country	No. of Indust.
US (713)	64	Germany (91)	35	Switzerland (59)	19
Canada(129)	40	Netherlands (30)	20	Australia (75)	30
Mexico(31)	9	Italy (73)	24	Thailand (70)	19
Austria(22)	12	Norway (19)	7	Hong Kong (79)	29
UK (255)	53	Belgium (36)	11	Indonesia (32)	14

Denmark(32)	14	Finland (27)	8	Japan (514)	54
Spain (32)	15	Ireland (11)	9	Malaysia (76)	24
France(117)	42	Sweden (40)	18	Singapore (51)	21
				New Zealand (17)	12

2.1. Traded goods and nontraded goods industries

Some studies show that the connection between different stock markets has increased over time. This includes research done by Harvey in 1991 and Chan et al. In 1992, Bekaert and Harvey conducted a study. In 1995, Dumas and Solnit, as well as Longing and Solnit, conducted their own studies. DeSantis and Gerardconducted a study in 1997. Another study was conducted by Reruns et al. The text is about the year 1995.

The Dow Jones World Stock Index data includes information from various industries. This allows researchers to compare how different factors, such as a country's economy or a specific industry, impact stock returns. For companies in certain industries, the reasons for changes in global industry factors can havea big impact on their stock returns. This is because their profitability, cash flow, and asset values are strongly affected by (a) changes in the prices of materials that are traded between countries and used by companies in that industry, (b) changes in the prices of goods or products that these companies sell, and (c) changes in the terms of competition with foreign companies for domestic exporters and companies that import similar products. Here is a simple explanation: We can look at the coal industry as an example. They make a product that can be easily traded around the world and it is all the same. Changes in the supply and demand of coal can greatly impact how much it costs to produce, how much money coal companies make, and the amount of money they have available for day-to-day operations and future investments. Exchange-rate shocks can change the prices of coal for domestic and foreign companies, and affect competition between them.

Panel B Industry	Agg.	No.	Industry	Agg.	No.	Industry	Agg.	No.
		Coo.			Coo.			Co u.
Food(T)	N	23	Pharmaceutical (T)	N	10	Consumer Products	N	6
Banks	F	22	Gas Utilities	U	10	Heavy Machinery (T)	D	6
Building Materials	D	19	Lodging	C	10	Office Equipment (T)	T	6
Insurance: All	F	19	Non- Ferrous Metal (T)	B	10	Oil: Majors(T)	E	6
Financial Services	F	18	Textiles& Apparel (T)	C	10	Overseas Trading	I	6
Chemicals (T)	B	17	Aerospace & Defense	T	9	PreciousMetals (T)	B	6
Media	C	15	Auto Parts & Equip (T)	C	9	Industrial Techno.	T	5
Paper Products (T)	B	15	Electric Compony. (T)	D	9	Mining(T)	B	5
Conglomerate	I	14	Entertainment	C	9	Software (T)	T	5
Heavy Construction	D	14	Food Retail/W holes.	N	9	Air Freight	D	4

Diversified Industries	D	14	Home Construction	C	9	Coal (T)	E	4
Real Estate	F	14	Securities Brokers	F	9	Forest Products (T)	B	4
Industrial Services	D	14	Telephone Systems	U	9	Medicaland Biotech.	T	4
Beverages	N	13	Tobacco (T)	N	9	Water Utilities	U	4
Home Furnishing	C	12	Communications Tech.	T	8	Advertising	C	3
Marine Transportation	D	12	Computers (T)	T	8	Cosmetics (T)	N	3
Oil: Secondary (T)	E	12	Containers & Pack	D	8	Railroads	D	3
Retailers: Broadline	C	12	MedicalSupplies	N	8	Semiconductors (T)	T	3
Retailers: Specialty	C	12	Auto Manufacture. (T)	C	7	HealthCare	N	2
Airlines	C	11	Factory Equipment (T)	D	7	Pipelines	E	2
Electric Utilities	U	11	Oil Equip. & Serv. (T)	E	7	Plantations	I	2
Steel (T)	B	11	Transport. Equip.(T)	D	7	Savings & Loans	F	1

Differentiating between companies in industries that trade goods and those that don't trade goods is a helpfulway to figure out how important industry and country factors are. Nontraded goods industries are industriesthat cannot trade internationally because the transportation costs are too high. In simpler terms, the way thatmoney is exchanged between countries and how industries are organized has been studied before, which can be used as a model for classifying something. The early macroeconomic models created by Dornbusch in 1973 and 1987 suggest ideas about how fluctuations in the exchange rate can impact salaries, the prices of products, and the value of assets in industries that don't involve international trade. When goods are bought and sold internationally, the exchange rate determines the price of domestic and foreign goods. These changes in the exchange rate can impact the prices of materials and finished products, which in turn affectshow profitable the industry is. In the finance world, Adler and Dumas (1984) and Levi (1994) studied how changes in exchange rates impact the worth of businesses and the choices they make in investing. They focused on industries that trade goods internationally and those that do not. Bodnar and Gentry in 1993, Alloyants and Uhlig in 1996, and Williamson in 1996 studied the effects of exchange rates on different industries. They focused on the differences between industries that trade goods internationally and those thatdo not. Because industries that trade goods have similar changes in input and output prices, theory says thatthe stock prices of these companies are more affected by changes in exchange rates. Changes in the prices of things going in and coming out of a business mean that there is a common reason within the industry that affects how much money people make from investing in companies that sell products.

We separate the Dow Jones World Stock Index industry groups into those that make goods that can be tradedand goods that cannot be traded. We use the definitions provided by Bodnar and Gentry's data appendix from 1993. Panel B of Table 1 shows the industries that trade goods, as indicated by the letter 'T' in parentheses. Some examples of things that are traded between countries are paper, oil, steel, clothes, cars, and computerparts. Our theory is similar to previous research on exchange rates and predicts that the impact of industrieson returns is more significant than the impact of countries for

industries that trade goods. The way of testingdescribed below gives a good framework to evaluate this idea or theory.

3. Methodology

The change in how much money you make from a stock can happen because of a few different things. Some of these things are the normal change in the country where the stock is, the currency that the stock is boughtand sold in, and the type of business the stock is from. The leftover differences can come from other causes that are not related to the country, currency, or industry, and can be called variations specific to the company. Heston and Roanhorse (1994) created a simple and easy-to-understand way of studying a problem using dummy variables. We use their framework to analyze and expand upon this issue. However, we use dummyvariable regression analysis for value-weighted index returns of individual securities, and not for the returns of individual securities separately. Usually, when data is "condensed," regression models will give different results because they don't take into account the spread of the variables around their average values for each group. In our situation, we don't lose any information when using the 'condensed' index-level data because the variation in the individual stocks' independent variables comes from the variation in the group values. The weighted least-squares estimators for the individual stocks and country/industry indexes are the same. You can ask the authors for a document that proves this fact.

The profit you get from investing in a stock in a particular industry may change because of different factors, like the country where the stock belongs or the specific industry it is in. There may also be some random changes that can affect the return on the stock. We calculate this equation every week for each country andindustry index.

$$R_{ic} = \alpha + \beta_1 I_{i1} + \beta_2 I_{i2} + \cdots + \beta_n I_{i66} + \gamma_1 C_{i1} + \gamma_2 C_{i2} + \cdots + \gamma_{i25} C_{i25} + e_i, \quad (1)$$

The return on the industry value-weighted index in a country is represented as Rk‘.

individuality to them. Every return is unique and influenced by the specific circumstances and characteristicsof the country and industry it belongs to.

The identification problem occurs when we define dummy variables for each country and industry. To solve this identification issue, you can choose a specific country and industry as a reference point. Then, you canunderstand the coefficients of the dummy variables as comparisons or deviations from this reference point. To prevent misunderstandings of a benchmark, we can make sure that for portfolios based on value, the total industry coefficients add up to zero, and the total country coefficients also add up to zero (Kennedy, 1986). We think that Eq. is approximately equal to. Rewrite this text using simpler words: (1) Can you please rephrase this paragraph using easier vocabulary.

In each of the 25 countries, we are looking at 66 different industry groups. But we have some restrictions.

$$\sum_{j=1}^{66} w_j \beta_j = 0, \quad (2a)$$

$$\sum_{k=1}^{25} v_k \gamma_k = 0, \quad (2b)$$

In simpler terms, *wk* means the importance of industry j and v' means the importance of country k in the global market portfolio. The smallest squared estimate of the starting point in the equation. later reassure you that everything will be fine. n(2) I will subsequently assure you that things will work out okay.

This text is about showing the amount of money gained from investing in the global stock market. Since theestimated disturbances do not affect the industry and country factors, the average leftover

after considering these factors is zero for each industry and country. The world market index is a way to measure the overallvalue of all industries and countries. Because of this, the average change in the world market index is zero.The intercept, or starting point, represents the value of the market.

Weighted least squares (WLS) calculations for equation (Eq.) are the predictions that take into account the importance or weight given to each data point when determining the overall estimate. (1) We calculate the values every week based on the limitations listed in Eqs. Rewrite this text using simpler language: (2a) and(2b). The weekly cross-sectional regressions give us a series of numbers that show how different countries and industries perform over time. We can think of the coefficient βK as an estimate of the industry's effect compared to the overall world market. Similarly, call represents the estimated effect of a specific country compared to the world market. The time series of these coefficients shows whether there is more change inthe effects caused by countries or industries. You can do a similar investigation with the nine main economicsectors.

4. Results

We calculate the weekly returns for all indexes using the prices from Wednesday to Wednesday. We run separate weekly analyses for different country and industry indexes. From these analyses, we estimate the coefficients and use them to create a series of estimated effects for each country and industry separately. Wecan break down the value-weighted index returns for Canada into two parts: one that is the same for all countries, and one that is the average effect of different industries.

This sentence talks about how the Canadian index is made up of different industries and also has a componentthat is specific to Canada.

$$R_{AC} = \hat{\alpha} + \sum_{i=1}^{66} x_{AC,i}\hat{\beta}_i I_{AC,i} + \hat{\gamma}_{AC}. \qquad (3)$$

In simpler terms, x^{a3}›k represents the part of Canada's total market value that belongs to industry group i. Please provide the original text that you would like me to simplify. investment in the education of immigrantsis substantial and benefits not only the individuals but also the Canadian economy as a whole. The report highlights that immigrants who receive higher education are more likely to find employment, earn higher wages, and contribute more in taxes. This means that investing in the education of immigrants leads to a higher return on investment in terms of economic growth and prosperity for both the individuals and the country.

the types of industries in each market are different). This means that the performance of individual countries can vary from the overall performance of the world market. More mining, non-ferrous metal, and forest products stocks are present, and the returns on Canadian stocks are different from stocks in the same industryin other countries. We can also create a global index for a specific industry, such as the steel industry (STL). This index will include a component that solely represents the industry itself, as well as a combined impact made by different countries depending on how many companies from each country are involved in the industry. Think about

$$R_{STL} = \hat{\alpha} + \sum_{j=1}^{25} \phi_{j,STL}\hat{\gamma}_j C_{j,STL} + \hat{\beta}_{STL}. \qquad (4)$$

The symbol ϕk›³T¹ shows how much of the global steel industry is made up of stocks from country j. The percentage of the whole The text is saying that the difference in returns between a specific country or industry index and the world market portfolio can be measured by comparing the variance of the pure effect (just the country or industry)to the variance of the combined effects of the country, industry, and market.

Tests using broad industry groupings

Table 2 displays the variation over time of these parts for each country and industry, with the use of weeklyreturns in US dollars and only nine broad economic sectors. In Panel A, we can compare the difference in each country's impact to the combined impact of all industries within that country. There are a few important findings. First, there are big differences in the total amount of variation

between the different parts of a country. The US has a small country effect variance, only 1. 51%, while Mexico has a much larger variance, 30. 88%, which is about 20 times greater than the US. Secondly, the combined effect of the industry only accounts for around 2% of the overall variability in the country indexes. This ratio is even lower than the average difference of 7. 1% found in Heston and Roanhorse's Table 3 when using value-weighted returns. This more dramatic result is expected because they only focus on 12 countries in Europe, while our study includes 25 countries from Asia-Pacific, Europe, and North America. In another study, Heston and Roanhorse (1995) suggested that looking at countries beyond Europe could show that country-related factors have a bigger impact. Panel B compares the differences in the strength of the industry factors and the combined impact of the country factors when explaining the performance of the industry sector portfolios. The energy sector has the highest difference in industry factors at 1. 614% When we look at the typical difference in outcomes between countries (8. 042%-squared) and industries (0. 704%-squared), we see thatthe ratio is 12:1. This is much higher than what Heston and Roanhorse discovered. Therefore, we can say that the impact of individual countries on differences in international returns is a very significant factor, evenmore so than what previous studies have shown.

Table 2

The index returns are broken down into the effects caused by different countries and industries using nine categories of industries. The returns are measured weekly in US dollars.

The table shows the difference between the different parts of the value-weighted country and industry index weekly returns from the Dow Jones World Stock Indexes. This data is for the period from January 1992 to April 1995. The return of each country is broken down into two parts: the specific effect of that country and the total effect of all industries. This is done using the dummy variable regression methods. Every industry index's performance is divided into two parts: the impact from the specific industry itself and the combinedimpact from all the countries. The ratio compared to the market is the ratio of how much a particular thing varies compared to how much the overall market's returns vary from the returns of the world market. Returnsare the amount of money you make or lose on an investment, stated as a percentage, that you earn or lose each week.

Panel A

Pure country effect Cumulative sum of industry effects

Variance Ratio relative				Variance	Ratio relative
		to market			to market
US	1.508	1.00		0.010	0.01
Canada	3.231	0.98		0.021	0.01
Mexico	30.877	1.00		0.075	0.00
Austria	4.458	1.03		0.047	0.01
UK	2.301	0.97		0.017	0.01
Denmark	5.635	1.01		0.055	0.01
Spain	7.043	1.07		0.210	0.03
France	2.986	1.01		0.006	0.00
Germany	3.741	1.08		0.050	0.01
Netherlands	1.990	1.00		0.137	0.07
Italy	15.732	1.02		0.157	0.01
Norway	6.408	0.98		0.179	0.03
Belgium	3.165	1.06		0.098	0.03
Finland	17.944	1.00		0.110	0.01
Ireland	5.780	1.08		0.117	0.02
Sweden	6.919	0.97		0.048	0.01
Switzerland	3.158	1.02		0.182	0.06
Australia	5.498	0.96		0.049	0.01
Thailand	19.358	1.02		0.208	0.01

Hong Kong	12.479	1.02	0.111	0.01
Indonesia	9.900	0.99	0.042	0.00
Japan	5.875	0.99	0.017	0.00
Malaysia	12.436	1.00	0.040	0.00
Singapore	7.443	1.01	0.087	0.01
New Zealand	5.196	0.98	0.110	0.02
Mean (median)	**8.042 (5.780)**	**1.01 (1.00)**	**0.087 (0.075)**	**0.02 (0.01)**

Table 2. Continued.

Panel B

Cumulative sum of country effects Pure industry effects

	Variance	Ratio relativeto market		Variance	Ratio relativeto market
Basic	0.029	0.05		0.556	0.93
Independent	1.006	0.63		0.658	0.41
Cyclical	0.046	0.20		0.261	1.14
Energy	0.458	0.24		1.614	0.86
Finance	0.177	0.18		0.741	0.75
Industrial	0.273	0.67		0.231	0.56
Non-cyclical	0.226	0.23		0.674	0.69
Technology	0.095	0.09		0.869	0.87
Utilities	0.166	0.22		0.732	0.96
Mean (median)	**0.275 (0.177)**	**0.28 (0.22)**		**0.704 (0.674)**	**0.80 (0.86)**

Show Our result is stronger primarily because our group of countries consists of Mexico, Thailand, Hong Kong, and Malaysia, all of which have significant influences in their own nations.

(4.2) Tests employing segmented industry groupings

One main idea we are checking is if the importance of a country's characteristics in determining global stockreturns is consistent regardless of how we define the industry. In other words, the tests we have done so farmight not accurately show any effects related to specific industries. Table 3 shows statistics about the impact of different countries and industries. It also includes more detailed information about 66 specific industry indexes. The variation of the country effects in Panel A is very similar to the variation calculated in Table 2.On average, it is about 8. 02% The variance of the overall impact of the industry on the market is also similar,at around 0. 187%-squared However, this only accounts for about 4% of the variability in the extra returns earned from investing in country indexes. The industry indexes have a higher variance of the pure industry effects compared to Table 2. The average is about double the variance of the cumulative sum of country effects. However, the difference in the effects of various countries (8. 02%-squared) is much greater than the effects of different industries (2. 416%-squared) — the ratio is 4 to 1. So, the power of country-related factorsin influencing global stock returns is strong, no matter how we define industries.

Table 3

Breaking down index returns into the effects of different countries and industries using 66 categories for industries and weekly returns in US dollars.

The table shows how much the values of different parts of the stock market changed each week from 1992 to 1995. The return of each country index is broken down into two parts: the country's overall effect and the total effect of various industries using a special statistical method. The return of each industry index is brokendown into two parts: the industry's own effect and the combined effect of the countries it operates in. The ratio relative to the market compares the variability of a component to

the variability of the index return compared to the world market return. Returns are a measure of profits or gains, expressed as a percentage, that are earned every week.

Panel A					Panel B								
Country	Pure country effect	Cumulative industry effects			Industry group	Cumulative country effects		Pure industry effect		Industry group	Cumulative country effects		Pure industry effect	
	Var	Ratio	Var	Ratio		Var	Ratio	Var	Ratio		Var	Ratio	Var	Ratio
US	1.499	0.97	0.0018	0.001	Advertising	1.131	0.244	3	0.776	Industrial technology	0.8695	0.288	2.145	0.66
Canada	3.241	0.98	0.143	0.004	Aerospace/defense	0.803	0.333	1	0.700	Insurance: all	0.484	0.449	0.601	0.61
Mexico	31.284	1.02	0.173	0.001	Air freight	0.607	0.111	4	0.882	Lodging	0.925	0.336	1.963	0.76
Austria	4.635	1.06	0.145	0.003	Airlines	0.333	0.200	1	0.888	Marine transport.	0.6616	0.229	1.223	0.57
UK	2.351	0.99	0.074	0.003	Auto manufact. (T)	0.455	0.244	1	1.002	Media	0.661	0.552	0.556	0.44
Denmark	5.767	1.03	0.170	0.003	Auto parts/Equ. (T)	0.791	0.700	0	0.755	Medical supplies	0.644	0.188	3.145	0.86
Spain	7.119	1.08	0.271	0.004	Banks	0.601	0.233	1	0.663	Medical/Biotech	1.071	0.112	7.760	0.84
France	2.930	0.98	0.029	0.001	Beverages	0.349	0.255	0	0.688	Mining (T)	1.464	0.334	2.088	0.48
Germany	3.675	1.06	0.107	0.003	Building materials	0.247	0.244	0	0.700	Non-ferrous metals (T)	0.163	0.007	2.159	0.91
Netherlands	1.975	0.94	0.240	0.111	Chemicals (T)	0.064	0.100	0	0.933	Office equipment (T)	0.675	0.500	1.448	1.06
Italy	15.232	0.99	0.149	0.001	Coal (T)	0.396	0.122	3	0.966	Oil equip./services (T)	0.829	0.133	5.818	0.92
Norway	6.572	1.00	0.215	0.003	Communio. tech.	0.353	0.100	2	0.811	Oil: majors (T)	0.814	0.300	2.127	0.79
Belgium	3.024	1.01	0.127	0.004	Computers (T)	0.309	0.008	3	1.033	Oil: secondary (T)	0.086	0.008	0.980	0.89
Finland	18.108	0.98	0.321	0.002	Conglomerate	1.003	0.662	0	0.400	Overseas trading	3.147	0.666	1.141	0.24
Ireland	5.316	0.99	0.146	0.003	Consumer products	1.006	0.333	1	0.522	Paper products (T)	0.084	0.007	1.162	0.91
Sweden	7.012	0.98	0.124	0.002	Container/package	0.161	0.144	0	0.855	Pharmaceutical (T)	0.228	0.111	2.102	0.99
Switzerland	3.142	1.01	0.384	0.122	Cosmetics (T)	0.181	0.100	1	0.777	Pipelines	1.489	0.377	3.172	0.79
Australia	5.317	0.93	0.133	0.002	Divers. industries	0.090	0.155	0	0.833	Plantations	12.439	0.577	7.014	0.32

One concern that arises is that our analysis poorly handles fluctuations in currency values. Since there are both real and nominal currency effects, we can't get rid of currency influences in our analysis using dollars.We can prevent the impact of currency differences by looking at the outcomes in the local currencies of foreign countries. This isn't a good solution because the returns in both dollars and local currency still have a risk premium related to currency. From the point of view of someone who invests money from the US, the dollar returns show how much money they made without any protection against changes in currency value. The local currency returns, on the other hand, represent the amount of money they made while protecting against changes in currency value. The unreported findings reveal that the impact on different industries remains nearly identical when comparing their weekly returns in the local currency versus returns in dollars. However, the effects on the country as a whole are not as significant. The results of the local currencyshow that the types of industries in a country's index can only explain about 4% of the differences in the average country index.

4.3. Traded and non-traded goods industries

One more compelling aspect of Table 3 is that it demonstrates variations in the levels of impact

exerted by different industries. For instance, industries like real estate, overseas trading, conglomerates, plantations, and factory equipment have small differences in their index returns, making up less than 40% of the total variation. On the other hand, industries like automobile manufacturing, computers, electric utilities, office equipment, and semiconductors have most of their differences in index returns due to the specific industry they belong to. Why do some industries have a strong industry factor affecting their stock returns, while other industries still have a strong country factor influencing their returns?

Mistake in guessing can explain it. Industry-effect variances are likely to be bigger in industries that are onlypresent in a few countries. This is because the effects of these industries are not as accurately estimated compared to industries that are present in many countries. So, the reason why the health care, pipelines, and savings and loans industries have big differences in the way they operate is because they only exist in three or fewer countries. Another reason could be that portfolios for industries that are not well-represented in different places, like plantations which exist only in Thailand and Malaysia, don't have a good range of different companies. For example, there might be ten companies from Malaysia and only three from Thailand. Looking at the pure industry-effect variances in Table 3 for these groups, we can see that they arehigher than the average. This suggests that there is less diversity among the companies or countries involved.

We also provide another way to understand why the differences in industry effects vary. important than macroeconomic effects in explaining exchange rate movements.

It is crucial for companies in industries that trade goods. If these companies are more affected by changes in the cost of a product they use or the price of the product they sell, then the connection between their stock returns would be higher. As a result, factors related to the industry can explain a larger amount of the changes in the returns of industries that trade goods. According to Table 3, industries that trade goods have the strongest impact on the industry factors compared to other industries. This is measured by both the total variance and the proportion of the total variance of industry index returns. For instance, out of the five industries with the highest ratios, only one (electric utilities) is not related to traded goods. Of the five industries with the smallest industry-effect ratios (less than 45% of total return fluctuation), all except factoryequipment are industries that do not involve trade.

To determine how much industry-effect variances matter, we do two things in a more official manner. To begin, we present the average and middle industry-effect variances for both the industries that trade goods and the industries that do not trade goods in Table 4. The results show that industries that trade goods generally have a stronger impact within their industry and a smaller proportion of their differences are due to the country they are in. The typical effect of industries is about 2. 764%-squared for industries that trade goods. This accounts for around 85% of the differences in index returns. For industries that don't involve trading goods, the typical effect on the industry is 2. 189 (1596) %-squared, which accounts for 70% of the total difference. Additionally, when looking at the total variation, the average cumulative sum of the country effect variances for industries that trade goods is 0. 751 (0727) %-squared, which is 15% of the total variation. This is actually lower compared to nontraded-goods industries, where the average cumulative sum is 1. 194 (0849) %-squared, accounting for 30% of the total variation. Next, we can compare the effects of countries and industries for industries that trade goods and industries that don't trade goods. We do this by combining the individual industry differences within each category and finding the average industry effect. We also calculate the total effect of each country by using a dummy variable regression model. This methodallows us to calculate a ratio of the differences that can be formally tested using an F-statistic. In Table 4, it shows the total amount of variance caused by country and industry effects for both traded and nontraded goods. It also includes the F statistics for these effects (1. 59 for country effects and 0. 79 for industry effects).These findings prove that the variances of pure industry effects and the cumulative sum of the country effectsare not the same.

Between industries that exchange goods and industries that do not exchange goods.

5. Economic implications

The size of a country and its industry has a big impact on how it affects the economy when trying to diversifyinternationally. A well-liked test calculates the amount that the return variance of one firm's stock can be lowered by mixing it with other randomly chosen stocks from the overall group. Solnit's important study in 1974 showed that investing in stocks from other countries can help US investors reduce their risk even morethan just investing in domestic stocks. By adding international stocks to their portfolio, US investors can lower their risk to as low as 11%. In our research, we want to know how investors get close to the limits of spreading their investments around the world. We will do this by making sure they spread their investmentsacross different countries but within certain industries, or across different industries but within certain countries. Additionally, we want to find out if there are different limits for industrial diversification depending on whether the goods are traded or not.

We are unable to analyze this using the Dow Jones World Stock Index database. So, we got information about specific stocks straight from a website called DataStream International. The group of companies we are studying is taken from a database called Dow Jones World Stock Index, which has 2400 firms. To select, we picked one stock from each country or industry group that had stock price data from January 1993 to April 1995. This means there are 577 stocks in total.

The typical difference in stock returns within a particular currency is 21. 67% per week, which is much higher than the differences based on the country and industry. To see how diversification can help, we lookat the connections between stocks based on the industries and countries they belong to, compared to the average amount stocks vary. The average relationship between stocks in the same country but different industries set a limit on how much diversification can be achieved within a specific industry. The average relationship between stocks in the same industry but from different countries sets a limit on how much diversification can be achieved by focusing only on one country. We can figure out how much we benefit from investing in different industries and countries by looking at how stocks from different industries and countries relate to each other on average.

We do this experiment separately for different groups of industries. We use broader classifications which areshown in Table 2, and also more detailed classifications shown in Table 3. This is a picture 1a and b compare the diagnostic for the nine main industry indexes with the diagnostic for the 66 smaller sub-industry indexes. This figure We found that when we put together different types of stocks from various industries into big groups in each country, it can lower the variability to 21. 9% of what it would be if we only focused on one individual stock. On the other hand, spreading investments across different countries, even within the same industries, can reduce risk by up to 8. 4% of the average individual stock volatility. This is close to the maximum limit of risk reduction, which is 7. 06% This is a brief description of a picture. 1b shows that within a country, the maximum diversification potential for industries is about 21. 75% of the average variation in stock prices. Similarly, for diversification across different countries, the maximum potential is about 8. 14% of the average stock price variation. There is a limit to how much a country or industry can diversify, which is not much lower than 7. 11% of the average stock variance.

We discovered that there is not much variation in diversification limits even when we limit our options to specific industries, even if there are 66 industries to choose from. Given the spread of the pure industry factor's impact in different industry categories in Table 3, we decide to investigate these findings more by studying country-only, industry-only, and unrestricted global diversification strategies for investors in various categories. The results are not shown in tables, but the authors can provide them if asked. In simple terms, we are studying different ways investors can spread their investments across different industries and countries. We are looking at strategies for diversifying investments in traded and nontraded goods, as well as for investors in developed and developing countries. Understanding diversification strategies at a detailed level is complicated because of how different industries and markets interact with each other. In emerging markets, there are more industries that trade goods. Calculating the average covariances within industries across markets for traded and non-traded goods also shows the variations in covariances between developed and emerging markets. Creating a statistical model that accurately represents all the combined effects

with this level of detail is called econometric modeling.

Table 4 is a chart or graph that provides information or data.

Studying the separate impacts on industries that trade goods and those that don't.

The 'Mean (Median)' for different industries is figured out by finding the average (median) of the combinedeffects of countries and industries. This is done separately for industries that trade goods and those that donot, using information from Table 3. Look at Table 1 to see how things are grouped together. The "Average Variance" for industries that trade and don't trade goods is calculated by combining the time data of all theeffects of countries or specific industries in that group. Then, the variance is estimated separately for the industries that trade goods and those that don't trade goods. The F-statistic is a number that measures the difference in variability between different groups. In this case, it is used to compare the variability betweendifferent industries and to see if the variability is the same for industries that trade goods and industries thatdon't trade goods.

Cumulative country effects Pure industry effect

	Variance	Ratio		Variance	Ratio
Mean (*median*) Nontraded goods	1.194 (0.849)	0.320 (0.285)		2.189 (1.596)	0.678 (0.695)
Traded goods	0.751 (0.727)	0.255 (0.150)		2.764 (1.988)	0.799 (0.845)
Average variance Nontraded goods	1.191	0.339		2.184	0.622
Traded goods	0.748	0.215		2.764	0.795
F-statistic (*p*-value)	1.59 (0.000)			0.78 (0.000)	

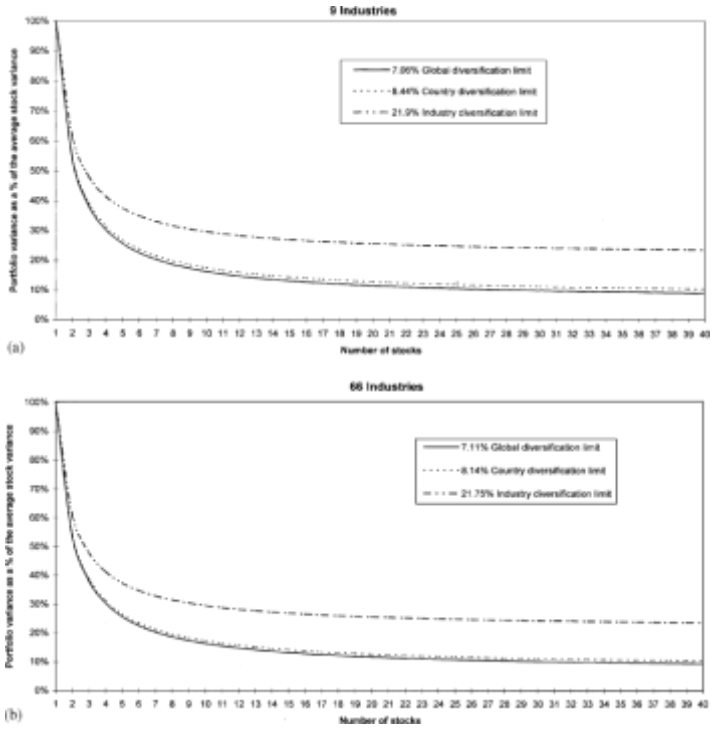

Fig. 1. Benefits of international diversification — nine and 66 industry cases

This graph shows how the portfolio's variance changes when more stocks are added, compared to the variance of a single stock. The information we have is about the returns of 577 different stocks. This data was collected every week from January 1992 to April 1995. The source of this data is DataStream International. The first line is about how much the investments in a portfolio spread out across different industry groups within one country. The middle line shows how much a portfolio with investments in different countries within one industry can vary. The main point is about a portfolio that spreads its investments across different countries and industries.

This paper is about a subject smaller in scope than what is being referred to. In industries where goods are traded between countries, the relationships between firms in the same industry across different countries are stronger compared to the relationships between firms in different industries. This difference is particularly clear when looking at correlations in well-developed markets. In countries like the US, Japan, the UK, France, Germany, and Canada, the average limit for spreading investments within different industries is 10. 9% But the average limit for spreading investments globally within these industries is only 6. 4% In industries that do not involve trading goods across countries, there are very few differences in theway stocks in the same industry and stocks in different industries are related to each other in different countries.

The effects of these relationships between variables depend on how the investor spreads their investments internationally. Most investors buy a mix of different types of industries when investing in securities. The type of industries in their portfolio only explains a small part of their investment returns. This is because noone industry alone makes up a large part of their investments. The effects of industries on investments are more important in industries that trade goods, but these industries make up a smaller portion of the overall portfolio. In simple terms, if people only invest in industries related to traded goods when investing abroad, their ability to diversify their investments may be limited. This is because they are not considering the different industries, they can invest in. We suggest that more research should be done on this topic.

6. Summary

This paper looks again at how different types of industries in different countries can help people benefit fromdiversifying their international investments. We use a new database called the Dow Jones World Stock Index,which covers 25 countries and has information on over 66 different industries. With this database, we analyze and break down the different reasons for variation in both countries and industries. Similar to Heston and Roanhorse (1994), our findings align with theirs, suggesting that industries within countries account for less than 4% of variations in country index returns. We also see that these patterns are different among differentindustries. In simpler terms, industries that deal with trading goods usually have a bigger impact on the overall industry. This difference could show important variations in the economic factors that affect how international stocks perform together. - It is advisable for portfolio managers to consider employing different strategies while investing in global markets if their investments are more focused on industries involved in international trade of goods rather than industries mainly selling goods domestically. Our initial results on this topic are not final and may change. the overall economy. - Understanding the impact of supply and demand, inflation, government policies, and international trade on the economy is crucial for further analysis. We look forward to more research being conducted on this topic.

Stock return correlations between different countries over a period of time and how the makeup of industriesaffects this relationship.

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