The ADR Market and the Effects of ADR Issue on the Underlying Security; a Survey

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Extracto

Esta investigación entrega las principales definiciones y características de los ADR (certificados de depósito estadounidenses) y su respectivo mercado. El texto expone los aspectos teóricos y prácticos de la alta demanda de ADR por parte de los inversionistas estadounidenses. También se abordan, en términos teóricos y prácticos, las razones por las cuales una emisión internacional puede inducir cambios significativos en el retorno y varianza de los valores implícitos doblemente listados. Finalmente, la principal conclusión del presente trabajo está dirigida al efecto sobre los valores implícitos después de la emisión internacional para empresas de tamaño medio provenientes de mercados de capitales semiintegrados.

Abstract

The present paper exposes the definition and main characteristics of American depository receipts (ADR) and their market. The research discusses the theoretical and practical explanations of the ADR demand by US investors. It also considers, in theoretical terms, the reasons why an international issue would imply changes in the return and variance of

the underlying security of ADRs, and comments on the evidence related
to such an issue. The main conclusion of this paper is addressed to the
impact on the underlying security following the international listing by
middle-sized firms from semi-integrated capital markets.

Introduction

American depository receipts (ADRs) are negotiable certificates evidencing
ownership of shares by non-US companies.[1] The certificates are backed by
ordinary shares which remain on deposit in the issuer's home market. ADRs were
created over 60 years ago to enable US institutional and individual investors to
purchase shares of non-US companies while owning a security that trades
according to US customs, with dividend payments in US dollars.

The statistic discussed in the next section indicates that US investors
present a high demand for ADRs. The major explanation for this high demand
is the benefit in diversification that US investors can achieve by investing in
ADRs. On the other hand, foreign companies can obtain better financing when
they are traded in a US market; this accounts for the company's interest in being
listed in a US market. However, the international issue implies some effects on
the expected return of the underlying security, which are discussed later in this
paper.

In particular, Speidell and Sappenfield 1992; Divecha, Drach and Stefek
1993 and other authors suggest that foreign securities have behaved differently
from American ones, giving an opportunity for diversification. Officer and
Hoffmeister 1987 posit that ADRs are an effective way to reduce risk in a
portfolio of domestic securities.[2] International diversification can be achieved
by direct foreign investments or by ADRs. According to Wahab and Khandwala
1993, international diversification by ADRs has the same effect as direct foreign
investment.

On the other hand, after the international issue the expected changes in
the underlying security return are explained by the liquidity effect, by the
diminishing of the company's asymmetric information, and by the market
semisegmentation between the foreign and the US capital markets.   The

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[1]Non-US companies are foreign firms, foreign governments' firms, or foreign subsidiaries
of US corporations.
[2]A domestic portfolio is composed only by US securities.

hypothesis of complete or mildly-segmented capital markets and the ADR market has been studied by Alexander, Eun and Janakiramanan 1988 and Howe and Madura 1990, concluding that international listing accompanies a decline in expected returns in small firms. In the case of mid-sized and large firms, markets are reasonably well integrated.

The present paper is comprised of four parts. The first part presents the main characteristics and statistics of ADRs. The second part discusses ADRs in international diversification. Next, the effect of the integration or segmentation between the foreign capital market and the US market and its implication in the expected rate of the underlying security return is discussed. Finally, in the concluding part, the main implications and characteristics of ADR markets are summarized.

I.   The Main Characteristics and Statistics of ADRs

ADRs are similar to US securities, which makes it easier for US investors to invest in non-US companies; however, ordinary shares on deposit are subject to settlement conventions that govern in the home market, which would differ from US practices. ADRs can be traded on the New York Stock Exchange (NYSE), on the American Stock Exchange (AMEX), on the NASDAQ Stock Market (NASDAQ) or on the Over-the-Counter Bulletin Board (OTC).

Non-US firms use ADRs to raise capital and to gain increased visibility in US markets. Moreover, an ADR generates shareholder interest and broadens the market for the company's security, lowers the cost to US investors in non-US securities, establishes a track record with the US financial community, promotes trading liquidity, and helps for future debt and equity offerings. Murgen 1994 notes that the ADR offering creates a new alternative to raise capital and a new commitment by the company to work seriously and professionally.

There is no important difference between an ADR and its underlying security, with the one exception that the ADR is denominated in dollars and the foreign stock is denominated in the appropriate currency for that particular country. ADR investors face currency risk in two ways. The first is that ADR holders may, at any time, obtain the underlying shares priced at local currency in the local market. The second is by dividend payments, where the depository bank makes the payment in dollars to the ADR holders, regardless of the currency of denomination of the original dividend payment.

An ADR issue can be sponsored or unsponsored by the issuing company. Sponsored ADRs are created at the request of the foreign company whose stock will constitute the underlying security behind the ADR. The sponsored issuer company bears all the costs of creation and administration of the ADR program, as well as exchange listing fees and SEC[3] reporting costs.

An unsponsored ADR program is initiated by an investment bank when it perceives an unfilled demand for the foreign security. Costs in this case are covered by the investment bank or the bank's customers. In unsponsored programs, more than one bank can perform depository services in connection with the trading of shares. Since no bank is appointed exclusively by the issuer to handle the program, the issuer is not a party of the depositary agreement. Unsponsored programs generally are traded on the OTC market with prices displayed on NASDAQ and the OTC Bulletin Board, or published daily in pink sheets. Bid/ask prices are set by market makers. Each market maker sets his own price for a trade; however, the prices displayed on the OTC Bulletin Board or on the pink sheets are indicative only.

In 1983, the SEC required issuers to file an information exemption to establish an ADR program. Given these reporting requirements, which demand greater issuer participation, issuers began to establish sponsored ADR programs, thereby gaining control over shares traded on ADR form and communication with shareholders outside the home market. Since 1983, few unsponsored programs have been established.

In April 1990, ADRs under Rule 144A (RADR) were created to increase the liquidity of privately-placed securities by allowing Qualified Institutional Buyers (QIBs)[4] to resell such securities privately to other QIBs without a holding restriction. Under Rule 144A, QIB investors may only resell ADRs in public after a two year holding period. Since the SEC registration and reporting requirements are minimal, the cost of raising capital in the US market under this rule is comparable to the cost of a similar operation in Euromarkets. The required time to complete a US equity placement has been reduced by Rule 144A. An RADR

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[3]Securities and Exchange Commission.

[4]QIBs include institutions that have under management at least $100 millions in securities, such as banks, savings and loans, insurance companies, investment companies, investment advisors, public employee benefit plans, employee benefit plans under ERISA, business development companies, small business investment companies, corporations, trusts or partnerships, or an entity owned entirely by qualified investors.

offering can be done with any class of shares not listed on a US exchange, and these do not have to indicate that they have been sold into Rule 144A.

Generally, RADRs are traded among QIBs in the United States through PORTAL,[5] and in the NASD's[6] markets for private-placed securities. QIBs are considered to be sophisticated investors by the SEC, since they do their own research and forego some of the measures designed by the SEC to protect individual investors. For RADRs, the SEC requires no registration.

Global Depository Receipts, GDRs, listed outside the United States can be listed publicly or privately in US markets. Through GDRs, firms can raise capital simultaneously in two or more capital markets. Since the GDR is a financial instrument with a structure that permits trading in two or more markets, it has a high level of liquidity through cross-border trading. GDRs are listed on the Luxembourg Exchange or quoted on the Stock Exchange Automated Quotation system based in London (SEAQ). Both the Luxembourg Exchange and the SEAQ link traders around the world.

GDRs require easier disclosure rules than those required for publicly traded ADRs in the United States. By issuing GDRs, firms may believe they are limiting their exposure to liability under US security laws. However, if firms sell securities in the United States, they are still subject to US security laws, even if they file for exceptions under Rule 144A.

Murgen 1994 points out that the main difference between GDRs and ADRs is that the American system permits issuers to set up a parallel program of unrestricted ADRs that can be traded in public markets. Typically, a company first raises equity in a US private placement under Rule 144A, restricted ADRs or in a public flotation outside the United States, using GDRs.

The increase interest for dual listed securities in the US markets is recorded by Greenwich Associates. They report that in 1993, 4.5 percent of pension fund portfolios were invested in non-US equities, compared to 2.7 percent three years ago. According to the source, it is expected that the amount of money that these institutional investors invest in ADRs will increase in the

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[5]PORTAL, Private Offering, Resales and Trading through Automated Linkages, is a screen-based automated trading system which provides security descriptions and pricing information. PORTAL was developed by the NASDAQ to support the distribution of private offerings and to facilitate liquidity in the secondary trading of Rule 144A security.

[6]NASD, National Association of Securities Dealers, is an association of brokers and dealers that establishes legal and ethical standards for its members. The NASD was established in 1939 to regulate the OTC market.

future. In fact, *The Wall Street Journal* (January 19, 1994) indicates that the percent of total portfolio invested internationally in 1994 was 6.8 and 9.0 for public funds and corporate funds, respectively; the 1996 projections are 11.7 percent and 12.2 percent, respectively.

On the US exchanges, where overall trading was up 33 percent in 1994, trading in listed ADRs soared 46 percent, to 6.3 billion shares, a record though still only 4.6 percent of the exchanges volume. In fact, most of the ADRs are unlisted, since they are traded in the OTC. If the OTC volume is added, the total number of shares is about nine billion in 1994.

According to Murger 1994, the 20% increase in ADRs listed during 1994 is explained by privatization and a hunger for growth capital around the world. She suggests that "Asia, led by India and China, will likely produce new programs, while Europe will likely top the charts in dollars raised, thanks to major privatization efforts by France, Italy, and Spain."

During 1993, banks created 124 new publicly traded ADR programs, plus 41 restricted ADRs under Rule 144A, for private placement markets. In 1994, the outstanding public ADRs were 996, and the total was 1,160. New ADRs listed during 1994 were 150. According to the Bank of New York, the offerings of 49 ADRs raised $9.5 billion in 1993. This amount is 113 percent of the number of offerings and a doubling of the money raised in 1992. The statistic for private placement during 1993 shows that the number of deals increased from 23 to 33, and decreased in the amount of money from $3.8 billion to $2.1 billion, in relation to the year before. The evolution of the main statistic in the ADR industry is presented in Table 1.

Table 1

Evolution of the ADR *Market*

YEAR	1990	1991	1992	1993	1994
New public ADR offerings	83	86	85	124	150
New public ADR offerings, in billion of dollars	$75	$94	$125	$201	$250
Who is winning the new mandates	Bank of N. York 75		Citibank 28	J.P. Morgan 18	

Source: Bank of New York

The dollar transaction of ADRs on the NYSE during 1993 and 1992 was $169 billion and $109 billion, respectively. The same statistic in the same period but on NASDAQ was $29.3 and $12.4 billion, respectively.

According to *The Financial Times*, the dollar value of the 1995 first-half ADRs trading volume was around $130 billion, flat to 1994. The total number traded on the NYSE during the first half of 1995 rose to 5.1 billion, a 40 percent increase over the last year. Eighty five companies launched new depositary receipt programs during the first half of 1995, where 35 of them rose $3.7 billion in new capital.

Murgen 1994 explains that the ADR market is an oligopoly, since three banks dominate the ADR offerings, but they are intense rivals: BNY, J.P. Morgan, and Citibank. "But the ADR boom is also attracting new entrants, such as Bankers Trust and Morgan Stanley, into the business. Bank of America has a small ADR operation that it inherited when it acquired Security Pacific, and there are rumors that Chemical Bank and Chase Manhattan may soon come into the business." The total fees involved in the ADR industry, during 1993, was $125 million for six depositary banks, up about 8 percent from the 1992 level.

Murgen 1994 suggests that there is a clear trend away from ADRs issued under Rule 114A towards full registration with the SEC. "Even with 144A placement, there is still a great deal of disclosure, the same road-show, and a lot of work leading up to the offering." In 1992, $2.29 billion was raised via 144A placement; this rose to $3.83 billion in 1993. The main problem in the 144A offering is the narrow number of QIBs and the rule that excludes the retail sector and small institutions in the 144A placement. Liquidity is often not very good on the Portal secondary market trading system, so even the QIBs feel more comfortable buying public stock offerings.

ADRs and the US Investors' Diversification

Diversification permits a reduction of portfolio risk, keeping or increasing the portfolio expected return. In this section we discuss the main literature regarding international diversification through ADRs. In fact, ADRs are an efficient way to achieve international diversification for US investors, often without incurring administrative problems and risks that other international

investment vehicles present, such as direct foreign investment, international found investment[7] and joint venture investment, among others.

International investors face exchange rate risk, restriction on capital flows across national boundaries, an added dimension of political risk and country-specific regulations, and differing account practices in different countries. When an investor invests directly abroad, he or she faces all the risks mentioned: however, when he or she invests in ADRs, only the exchange rate risk and the political risk must be faced. In fact, there are neither capital flows across national boundaries risk nor different account practices.

Speidell and Sappenfield 1992, ss hereafter, suggest that the interest of investors in foreign securities is explained by the higher returns perceived to be earned on these securities and the diversification effect that non-US and US equity portfolios can provide. The major points that are mentioned for international diversification are:

-   Global markets have wide differences in historic returns and risk.

-   Emerging markets have had higher risk and returns than developed markets.

-   The EAFE Index[8] has had lower risk than its individual country components.

The benefit of diversification can be observed in the correlation between the S&P 500 and the EAFE Index, which was 0.61 during 1988 to 1990. The International Finance Corporation Emerging Markets (IFC) index standard deviation is 35 percent, for the same period. According to the authors, the diversifying benefit of EAFE is still great enough to lower risk significantly, with only a slight decline in return.

SS 1992 argue that the correlation between these international indices has been increasing during the last several years. The authors give three reasons to support this opinion. First, institutional portfolios are more important, and large amounts of trading are controlled by only a few decision makers, who tend to be

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[7] In the international mutual fund in the US market there are two types of funds, single country focus and international focus.

[8] European, Australian and Far Eastern.

more alike and driven by similar input. The second addresses the fact that indices tend to bid stocks together. Third, the European Common Market is linking the economic fortune of European countries.

Since the correlation between developed markets is expected to increase, investors can use emerging markets to diversify their portfolios. In particular, SS 1992 analyze the correlation between emerging markets and the US market, with and without two global events: the 1987 crash and the Kuwait invasion. The correlations are 0.22 and 0.15 with and without the major events, respectively. In the same study for developed markets and the US market, the results are 0.62 and 0.45, respectively. SS 1992 estimate that the optimal investment in securities from emerging markets is between 10 and 15 percent of the portfolio, to decrease the risk portfolio without affecting the expected rate of return.[9]

Divecha, Drachm and Stefek 1992, DDS hereafter, find that emerging markets present higher volatility than developed markets, and both have low correlations between each other. They conclude that a modest investment in the emerging markets leads to lower portfolio risk for a global investor. A remarkable result addresses a high homogeneity among the stock returns in the emerging rather than in the developed markets.

The volatility of the emerging markets is explained by two factors. First, these markets tend to be fairly concentrated, since large stocks have a high proportion of the overall market capitalization, implying few opportunities for diversification. Second, in emerging markets all the industries are affected in the same direction and magnitude for an economic phenomenon.

Officer and Hoffmeister 1987, OH hereafter, point out that even though direct international diversification is beneficial for investors, it is difficult to achieve. The major obstacles that international investors face in direct investment are related to unknown administration procedures and different risks.[10] For US investors, ADRs are a convenient way to achieve international diversification, without any of the administrative problems associated with direct ownership of foreign securities.

OH 1987 test the hypothesis that ADRs are a good substitute for direct international investments. They select a sample of forty-five ADRs, from Australia, Japan, the Netherlands, South Africa and the United Kingdom, from

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[9]In an American portfolio, the current levels of foreign investment is about 0 to 1 percent.
[10]Such as currency risk, country risk, etcetera.

1973 to 1983. The domestic sample is a random selection of twenty securities that are continuously traded on the NYSE and the AMEX, as well as twenty-five issues actively traded in the OTC market, for the same period. From the CRSP tape,[11] they calculate the monthly rate of return for all domestic stocks, and ADRs, and for an equal-value weighted index for the NYSE and AMEX. The first step in the OH 1987 investigation is to obtain a measure of systematic risk, using the CAMP model,

$$R_{i,t} = \alpha + \beta R_{m,t} + e_{i,t},$$ (1)

where $R_{i,t}$ and $R_{m,t}$ are the rates of return on security i and the CRSP equally-weighted market index, respectively; α and β are the intercept and the slope of the regression, and $e_{i,t}$ is an error term assumed to satisfy the usual OLS[12] assumptions.

They adopt the Evans and Archer 1978 technique to construct random portfolios of various sizes from the sample of ADRs and domestic securities. The portfolio average mean rate of return is calculated by

$$R_p = \frac{1}{n} \sum_{t-1}^{N} R_i,$$ (2)

where the average return and standard deviation of each random portfolio is obtained. The portfolios are formed for purely domestic securities, pure ADRs, and combinations of domestic and ADR securities.

Using the single-index market model, they obtain the systematic risk for ADRs of each country and for the domestic portfolio, as well as for the pure ADR portfolio. The beta range for each country is from 0.067 to 0.423, and the pure ADR portfolio beta is 0.264. The domestic security portfolio shows a 1.010 beta. These results indicate that a significant reduction in standard deviation can be obtained if portfolios are made up of domestic stocks and ADRs.

Using the random portfolio selection for domestic securities, OH 1987 observe that most of the unsystematic risk is eliminated with a portfolio of eight securities. The standard deviation of the eight domestic securities portfolio is

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[11]Center of Research in Security Prices at the University of Chicago.
[12]Ordinary least squared.

5.55 percent, and the same statistic, but for the twenty-five domestic stocks, is 5.21 percent. The average annual rate of return on the eight domestic securities portfolio is 13.32 percent. The standard deviation of the ADRs portfolio is minimized at eight securities, but it is higher than the eight domestic securities portfolio, 6.23 percent. The annual rate of this portfolio is 12.96 percent. OH 1987 test the hypothesis of equality of means in both portfolios. They cannot reject the null hypothesis at the five percent level of significance, suggesting that the ADRs annual rate of return is not significantly different from the annual rate of return of the domestic portfolio.

As a remarkable conclusion, OH 1987 suggest that "investors can reduce their risk exposure by 20 to 25 percent when as few as four ADRs are combined with four domestic securities, without any reduction in expected returns". The authors argue that this result is valid for ADRs for other countries, such as France and Germany, as well as ADRs from emerging markets.

Wahab and Khandwala 1993, WK hereafter, examine the merit of ADRs compared to the respective underlying stocks as international diversification vehicles. They collect closing daily data on thirty-one pairs of ADRs and underlying stocks, exchange rates for eight currencies,[13] and the S&P 500 index[14] from December 31, 1988 to December 31, 1990.

Since the methodology applied is based on an American investor's viewpoint, the underlying asset price is adjusted by

$$R^{\$}_{i, j, t} = (P^{FC}_{i, j, t} \times S_{j, t} - P^{FC}_{i, j, t-1} \times S_{j, t-1})/(P^{FC}_{i, j, t-1} \times S_{j, t-1}), \qquad (3)$$

where the first term is the adjusted return of the underlying asset. P and S are the foreign currency dominating prices for the ...ith underlying share and the country's spot exchange rate expressed as dollars per foreign currency. Subscripts i, j and t are the identification for the particular security, country and time, respectively. The superscript FC means foreign currency.

They use two strategies in the portfolio formation between the three pure portfolios. In the first, they implement five portfolios based on alternative investment weights of ADRs or their underlying shares in the combined portfolio

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[13]Currencies from Australia, France, Germany, Japan, Luxembourg, Norway, South Africa and the United Kingdom.

[14]The authors considered this index as a proxy of the domestic market portfolio.

with the S&P 500. In the second one, the authors analyze alternative size combinations of ADRs with S&P 500 versus underlying shares with S&P 500.

WK 1993 notice that the greater the assumed investment proportion in either ADRs or foreign shares, the larger the percentage of decline in annualized standard deviation of daily returns on the combined portfolio, in comparison to the standard deviation of the return on the S&P 500. For instance, in the investment of a proportion of 10 percent in ADRs (seven ADRs), the annualized standard deviation of daily returns on the S&P 500 drops from 30.2 to 21.23 percent. Adding seven foreign shares to the S&P 500 portfolio, the same parameter drops from 30.2 to 21.07 percent. ADRs and their underlying shares appear to contribute equally to risk reduction benefits. The evidence indicates that risk can be cut almost in half with an investment in only seven ADRs or seven foreign shares, using 50 percent weight. Increasing the number of ADRs or foreign shares beyond a total of seven results in rather marginal reduction benefits, whatever the investment weight.

The annualized mean return for different portfolios with varying sizes and investment weights of ADRs and foreign shares shows interesting results. A combined portfolio of the S&P 500 and seven ADRs or foreign shares outperforms the S&P 500 pure portfolio in risk and return. Adding more than seven non-US securities appears to result invariably in a decline in expected daily return.

WK 1993 conclude that "if both ADRs and foreign shares contribute equally insofar as expected returns are concerned, and furthermore, a portfolio containing ADRs has lower variance, then diversification benefits clearly stand to be gained by including ADRs rather than the respective foreign shares, according to simple dominance argument".

The literature discussed in this section indicates that US investors can obtain high benefits investing abroad. In particular, ADRs are a convenient way to obtain these benefits, and their use in international diversification is the main variable that explains the high US investors' demand for these dual-listed securities.

Mildly Segmented Capital Markets and the Effect
on the Expected Return in the Underlying Security

In the literature it is mentioned that the expected return of dual listed securities is affected after international issue. There are three reasons that explain this hypothesis. The first one relates to the liquidity effect that the international issue implies to the underlying security. The second is the sign of goodwill of the company to provide information to the international investor and to the SEC. The third is semisegmentation of the capital markets.

As it was mentioned earlier, foreign firms that are traded on a US stock exchange have a record in that financial industry, where lenders know the company and it is monitored by different economic agents, generating more information, which is incorporated into the borrower ranking of the company. Since the dual listed company is widely known, it can obtain better financing than a foreign mono-listed company.

On the other hand, when a foreign company is listed in the United States, it remains committed to provide all the information that the regulatory US agency has established, as well as its amendments. At the same time, the level of sophistication of US investors is one of the most advanced in the world, so they analyze the company information and the management decisions in a better and more efficient way than other investors. Due to this effect, it is expected that the asymmetric information in a foreign company diminishes when the foreign firm is listed on a US stock exchange.

Also, the effect in the expected return of dual-listed securities is explained by the semi-integration of the capital markets. In a perfect integrated world, assets with the same risk have to have the same expected return. An ADR and its underlying security are expected to have the same risk, concluding that in a perfectly integrated capital market the expected rate of return of the underlying security does not present changes after the international issue. In addition, if capital markets are not integrated, it is expected that the return of the underlying security will change after the international issue.

Different authors study the integration between some capital markets and the world capital market, all of them indicating that most of the developed capital markets are relatively well integrated. Among these authors are Becker, Finnerty and Friedman 1995; Bekaert and Harvey 1995; Harvey 1991, 1993a, 1993b, 1995; Dumas and Solnik 1995; Dumas 1994, and Wheathey 1988. Other groups of authors have been studying the integration between different

capital markets and the US market, concluding that the influence of the latter is strong. Hamao, Masulis and Ng 1990; King and Wadhwani 1990; King, Sentana and Wadhwani 1994; Campbell and Hamao 1992; Chan, Karolyi and Stulz 1992; Dwyer and Hafer 1988; Eun and Shim 1989, and Parisi 1995 show that the US return and variance are significant in the returns and variances in different countries, implying that these capital markets are integrated to the US capital market. These investigations suggest that dual listed securities are not expected to show changes in their returns after the international issue.

Alexander, Eun and Janakiramanan 1988, AEJ hereafter, test the hypothesis of completely or mildly segmented capital markets in the international listing of a security. AEJ 1988 use a sample of thirty-four ADRs traded on the NYSE, AMEX or NASDAQ system. The data consist of the dates of initial listing in the US and monthly rate of return, from 72 months before to 36 months after the listing date. AEJ 1988 test the null hypothesis of no change in the expected return before and after the dual listing date. The authors consider that bias selection may exist if an estimation period shortly before the international listing date is used to estimate returns. To avoid the bias selection problem, AEJ 1988 implement the mean adjusted returns methodology, defined by Brown and Warner 1980. The return-generating process for the security of a firm can be seen as

$$\hat{R}_{it} = \overline{R}_i + e_{it}, \tag{4}$$

where R_i is the expected return, and e_{it} is the residual or abnormal return. For each firm, monthly residual returns are estimated over an observed period from 72 months before the event month through 36 months after the event month.

AEJ 1988 use the following CAPM-based return-generating process to test for the presence of liquidity-signalling effects and selection bias:

$$R_{it} - r_t = \alpha_i + (R_{mt} - r_t)\beta_i + \epsilon_{it}, \tag{5}$$

where R_{mt} and r_t denote the market and riskless return in period t, respectively. Since the α estimator can be viewed as the average monthly abnormal return on security i during the estimation period, this estimator should not be significantly different from zero if the CAPM is valid and if both liquidity-signalling effects and bias selection are absent in the estimation period.

AEJ 1988 report the results surrounding the month in which a foreign firm stock is dually listed on a US capital market. The pre-listing period, at the beginning of this, presents abnormal returns, but the authors explain this result by the strong performance records that these types of firm present previous to the international listing. In the same subsample, but at the end of this, the results indicate a general downward drift at month -2, a probable time when the information concerning international listing may be known to the public.

AEJ 1988 test the previous equation for 13 Canadian and 21 non-Canadian firms with ADRs, where eight and 15 have a positive alpha, respectively. Of those, three and six are significantly positive at the ten percent level, with two and four being significant at the five percent level. A t-test on the distribution of alpha suggests that the mean value for the Canadian and non-Canadian ADRs subsample is significantly positive. This result suggests that bias is present in the estimation period.

The mean return for each stock in the sample is estimated by calculating the average return of each stock during the pre-listing estimation period from $t=-72$ to $t=-37$. The mean return for each stock in the sample is estimated by calculating the average return of each stock during the post-listing estimation period from $t=+1$ to $t=+36$. Finally, the difference in the estimated mean for each stock is determined, and the tests are performed on the set of 34 differences.

The results for the non-Canadian subsample indicate that international listing seems to accompany a decline in expected return for the overall estimation period. The t-test and Wilcoxon test show that the difference in the means between the pre-listing and the post-listing estimation periods is statistically significant at the one percent level for the overall sample as well as for the non-Canadian subsample.

The adjustment for possible bias selection suggests that the decline in the expected return is not as large as the theory predicts. Nevertheless, the t-test results show that the null hypothesis still can be rejected for the overall sample as well as for the non-Canadian subsample. The Wilcoxon test results also indicate that the null hypothesis can be rejected for the two samples at similar levels of significance. These findings corroborate the earlier findings that are based on event-time analysis of the residual returns, but are somewhat weaker than unadjusted findings.

Howe and Madura 1990, HM hereafter, study the impact of international listing on risk and its implications for capital market segmentation. Their

hypothesis is that in the presence of segmented capital markets, an international listing should have an effect on the listing firm's stock. To test the hypothesis, they implement four techniques. The first is based on the simple and two-index CAPM model[15] for the dual listed security, as the following equations show:

$$R_i = a_i + b_i R_{m,US} + e_i,$$

(6)

$$R_i = a_i + c R_{m,US} + d_i R_{m,fro} + e_i,$$

(7)

where R_i is the return on stock i, $R_{m,US}$ and $R_{m,for}$ are the return on the US and foreign market indices, respectively; the null hypothesis is a no change in the domestic beta. The second model requires that the beta in the foreign market be estimated. Using the latter equation, the null hypothesis is a no change in the foreign beta before and after international listing, against an increase in the foreign beta. The third test explores changes in standard deviation before and after the international listing where the null hypothesis postulates that the international listing should not cause a decrease in standard deviation.[16] The examination of R^2 of the univariate market model before and after the dual listing is the fourth model, where its null hypothesis is not different in R^2 before and after the dual listing. HM 1990 collect data from 16 quarters prior to and after the initiation of the dual listing. They selected 68 internationally listed stocks from France, Germany, Japan and Switzerland.[17]

The first results of the model indicate that the null hypothesis is not rejected at the one percent level of significance, even though all the post-listing betas are less than the pre-listing betas. Using the two-market index model, the measure of the post-listing beta is similar to the univariable model, and an insignificant difference is detected. In both cases nonparametric tests are implemented, and all of them indicate no significant evidence to reject the null hypothesis.

In the second model, foreign betas are small, in relation to the previous results. The difference between the beta before and after international listing is

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[15]The two indices are the U.S. and the foreign market.

[16]Howe and Kelm 1987 conjecture that dual listing of securities increases uncertainty, increasing the security standard deviation.

[17]The authors recognize that the sample presents problems in the beta estimation due to their intertemporal instability.

not significant enough to reject the null hypothesis. Based on these results, dual listing does not affect the security's sensitivity to the country-of-listing market.

Analyzing the pre and post-listing standard deviation, the authors report values of 15.5 and 14.4 percent, respectively; this difference is not significant. This finding is robust across location of listings and does not support the idea of a shift in total risk associated with a dual listing.

In the R^2 analysis, the test is implemented for both the single and two index market model. In the single market model, the R^2 is 0.375 and 0.382, respectively for pre and post-listing events. In the two index market model, the results are 0.426 and 0.431, respectively. Based on these figures, the null hypothesis cannot be rejected; therefore, indirect evidence of an integration effect in markets is not observed. The residual variance results are 0.017 and 0.015, respectively. The difference is not significant, rejecting the asymmetric information's hypothesis.

IIM 1990 conclude that markets are already reasonably well integrated. They interpret these results as a degree of segmentation related to the type and size of the firm. IIM's remarkable conclusion suggests that "greater benefits to a dual listing would accrue to small firms with relatively low levels of foreign investment activity".

Jarayaman, Shastri and Tandon 1993, JST hereafter, analyze the impact of international cross listing on risk and return. They use the ADRs as a proxy to test the existence of informed traders in the markets in which the ADRs and the underlying stocks are traded. JST 1993 report that the listing of ADRs is associated with positive abnormal returns in the underlying stock on the listing day. Another result deals with an increase in the return volatility of the underlying stock, after the international issue. To test their hypothesis, JST 1993 use a sample of 95 firms that are registered in a country other than the United States and have an ADR initially listed on a US exchange over the period of 1983 through 1988, from Japan, the United Kingdom and other countries.[18]

JST 1993 examine the behavior of the returns in an event date portfolio of the underlying stock, and compare the volatility of the returns on the underlying stock of the pre-listing period with that of the post-listing period. They measure the effect of dual listing using the mean adjusted return model for stock returns. The comparison of volatility, autocorrelation, betas and residual risk is based on pre-listing values estimated over a 125-day pre-listing period

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[18]The other category considers ADRs from Australia, France, Germany, Italy and Sweden.

starting 150 days and ending 26 days before the listing date, and post-listing values estimated over a 125-day post-listing period starting 26-days after and ending 150 days after the listing. Using a 51-day window, from -25 to +25, in relation to the event day (0), the excess return is 0.47 percent, with an associated z-statistic of 2.21. The sample is divided by the security's country, such as Australia, France, Germany, Italy, Japan, Sweden and the United Kingdom. Only the Japanese ADRs are associated with a significant abnormal excess return (0.8 percent). The rest of the countries in the sample do not present any effect.

The positive reaction of stock return at the dual listing day is explained by the greater liquidity that accompanies such listing. JST 1993 do not find negative post-listing performance. JST's results are inconsistent with those of Alexander et al. 1988 and of Howe and Kelm 1987. In the first study, the abnormal returns are positive in the pre-listing period, insignificant in the listing period, and negatively significant in the post-listing period. Alexander et al. 1988 report that the listing day is associated with insignificant abnormal returns and preceded by negative significant abnormal returns.

The volatility comparison is based on pre- and post- listing variances computed on the underlying security, where the 125-day pre-listing period starts 150-days before and ends 26-days before the ADR listing day. The ADR listing is associated with an increase in the underlying security variance, increasing 55.7 percent; this result is significant at the one percent level. The same methodology but for the subsample by countries indicates a statistical and economical increase in variance. There are two hypotheses that explain the increase in variance after the dual listing. First, increased trading time associated with the cross-listing allows for more revelation of information (Freedman 1989). A second explanation is based on the increased trading that allows for more noise trading (Black 1986).

French and Roll 1986 suggest that the noise trading effect is associated with the autocorrelation structure. JST 1993 test the hypothesis that in the presence of noise trading, overreaction in stock price would be corrected in subsequent trades, thus inducing a negative autocorrelation structure. These authors report the autocorrelation for lags of one, five and fifteen days in the underlying security; the results indicate a very small change in the autocorrelation structure associated with the listing, suggesting that the increase in volatility is not consistent with the noise trading hypothesis.

JST 1993 implement two adjustments to the French and Roll 1986 test. First, they examine the impact of the international listing on a market-adjusted

volatility of returns on the underlying stock. Second, they examine the previous test eliminating all listings from the sample where either the pre-listing or post-listing period include the month of October 1987. In both cases, the result is that the increase in the volatility of the underlying stock is not affected by these two adjustments.

Another argument that would explain the increase in variance is also studied by JST 1993. The hypothesis is that the ADR return is explained by the two factor asset pricing model after the dual listing event, using the US market and the foreign market index returns. The test consists of estimating and comparing the market coefficients for both indices, before and after the dual listing day. The results indicate an insignificant effect on both the foreign and US market beta coefficients. Also the results show no increase in the explanatory power of the asset pricing model of the two indices, measured by the residual variance and the R^2.

Rosenthal 1983 develops an empirical test for efficiency in the ADR market. The main conclusion indicates that returns on a sample of ADRs listed on the NYSE and NASDAQ from 1974 to 1978 are consistent with weak efficiency form. Based on the arbitrage theory, it can be argued that a dually traded security should have the same price in both markets. However, there are some administrative costs that may permit a potential violation of the arbitrage equilibrium. ADRs have similarities with the underlying shares, but international capital market imperfections could result in some differential pricing vis-a-vis the underlying security and the ADR.

Rosenthal 1983 argues that if a capital market is efficient in its weak form, there should be no linear dependence between lagged security returns, either statistically or economically. The author selects 54 ADRs from different countries, such as Australia, Germany, Israel, Japan, Mexico, the Netherlands, South Africa[19] and the United Kingdom. To test the validity of the arbitrage theory, Rosenthal 1983 obtains the serial correlation on weekly and biweekly returns for lags of 1, 2 and 3 periods, and on monthly returns for lags of 1 and 2 periods. If the sample correlation coefficient is greater than twice its standard error, the hypothesis that the true value is zero can be rejected at the 95 percent confidence level. The weak form of the capital market efficiency allows us to expect that no more than five percent of the securities in the sample will exceed two times the standard errors and that the ratio of the sample standard deviation

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[19] The South African ADRs are GDRs.

to its standard deviation should be close to one. In the case of the Japanese and British ADRs, the null hypothesis is rejected in statistical and economic terms. The tests of the South African ADRs are inconsistent in statistical terms but not in the economical sense. The author concludes that it does not appear that any of the correlation coefficients are significant in an economic sense for the rest of the countries in the sample.

Kato, Linn and Schallheim 1991, KLS hereafter, investigate the arbitrage opportunities in the ADR market. They find evidence to support the law of one price. However, the prices of the ADR and its underlying security are not perfectly correlated. These authors explain this phenomenon by the overlapping in trade time in both markets.[20] KLS 1991 obtain the correlation between each pair of prices in contemporary and lagged fashions. The sample is composed of 23 pairs of ADRs and underlying security returns from Australia, Japan and the United Kingdom. The sample period is from January 1, 1980 to December 31, 1984. Due to the five hour difference between London and New York, the ADR prices represent five more trading hours than the US stock. The time difference between the NYSE and the Japanese Stock Exchange (TSE) is 13 hours; therefore the opening price on the TSE is chosen to compare to the closing US market price on the previous day.

The large difference between the ADR price and its local underlying stock price was $0.42, in the British case. According to the authors, it would probably exceed transaction costs, but it is not statistically significant. In general, the median difference is also statistically insignificant, based on the rank-sum test. The sign test and Wilcoxon test for the British ADRs are reported to be insignificant for each firm. The ADR prices tend to lie below the underlying security price adjusted for the exchange rate. However, since the differences between the mean and median are so small, no potential abnormal profit exists. The Japanese ADRs do not present significant differences in terms of mean and median of the price series; in economic terms, however, all the Japanese dual listed securities show statistical differences, according to the sign and the Wilcoxon tests. The statistical results for the Australian ADRs are close to those of other countries; two firms show statistically significant differences, but not in economic terms.

KLS 1991 perform a correlation test for the total sample and by countries and securities. The authors note that the contemporary correlation is not close

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[20]This overlapping would imply spurious return-correlation results.

to one, ranking from 0.023 to 0.947. This correlation is statistically different from zero and one. The explanation can be found in the timing difference between the calculation of those returns.

British ADRs present lead and contemporary correlations that support the hypothesis. In the lagged correlation case, five of the seven ADRs show significant correlation, but their magnitude is lower than in the case of the other series. The Japanese ADRs present a highly significant lagged correlation, which is expected since the timing difference between both markets is much lower than the contemporary correlation. The results for the Australian ADRs show a significant contemporary and lagged weekly correlation, and little correlation with the next week.

KLS 1991 conclude that the arbitrage theory is supported in the ADR market. The price of the ADR and the underlying security is not perfectly or closely correlated, a phenomenon explained by overlapping time periods for the return calculations.

Conclusions

A US investor can achieve diversification benefits investing in ADRs. In fact, a combined portfolio comprising domestic and ADR securities allows a reduction of the risk that the investor faces with almost no effect in the expected return. Since ADRs are from large and well known firms, the segmentation of the capital market does not exist, allowing the investor to diversify efficiently by using ADRs over other vehicles. This reason explains the high demand for ADRs by US investors.

Also, the diminish in the asymmetric information and the new and more convenient financing sources for the dual-listed company explain the interest of foreign companies in their international issue.

The ADR price evolution, before and after the international initial public offer, indicates that these securities present a common behavior. The announcement of the issue is accompanied by an increase in the ADR price, an insignificant price variation around the international initial public offer and a decrease in the price after the issue.

Finally, the semi-integration between the US market and capital markets from undeveloped countries would imply that firms from these countries that are

planning to be traded in a US capital market would expect their return to be significantly affected after the international issue.

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