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The Integration of Secondary Equity Markets in Europe, and the Barriers Posed by Separate Currencies

Final draft [minus conclusion]

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This paper examines the role that exchange rate variability plays in impeding the integration of equity markets, and in particular the role that Economic and Monetary Union, or at least stabilization of European exchange rates, could play in advancing the integration of European equity markets. Two kinds of integration are of interest: cross-border trading and holding of equities, and the consolidation of financial centers that are currently dispersed across countries into one or more major ones.   The currency question is relevant for both.

1. Is Regional Integration of Equity Markets to Be Desired?

International economic integration is, in general, a trend that is well worth promoting. The clearest and most familiar case is the one in favor of international trade in goods and services, which promotes welfare both for buyers, who can buy imported goods more cheaply than at home, and sellers who can sell exports for higher prices abroad than at home.   There is an analogous case to be made in favor of international capital flows. Internationally-liberalized financial markets allow corporations and other borrowers to raise capital more cheaply than when they are restricted to raising funds at home, and investors earn higher expected returns for a given level of risk by diversifying abroad.

The case for capital mobility requires a few more nuances than does the case for trade in goods and services. Some believe that there are possible market failures in financial markets -- arising, for example, from the presence of speculative overshooting and from the absence of an international debtors' bankruptcy court -- and that these have contributed to recent difficulties in emerging markets and in foreign exchange markets among industrialized countries. But overall, the advantages of open financial markets dominate. Equities are a particularly attractive mode for international capital flows.   In the event of adverse economic outcomes, equity prices automatically

fall, eliminating the need for lengthy and costly negotiations between borrower and creditor countries, such as occurred over the terms of bank loans in 1982, or over the terms of bonds in other crises.[1]

The case in favor of the integration of equity markets on a *regional* basis requires yet more nuances. Integration on a worldwide basis is better from the standpoint of economic welfare than regional integration alone. Interesting questions arise when one takes the degree of worldwide integration as given, constrained by political considerations. If the first-best is not attainable, what is the second-best? The net welfare effects of regional trade integration depend on weighing costs and benefits, often phrased as trade-diversion vs. trade creation. Breaking down some barriers within regional grouping can raise economic welfare on net, even when it gets a bit ahead of worldwide liberalization.[2] A particular advantage of regional integration is that it can allow the exploitation of economies of scale, which are not taken into account in classical models of trade under perfect competition. Furthermore, regional economic integration helps foster regional political integration, which can be an important goal in its own right.

Regional integration of equity markets has two distinct facets. First, issuers and investors expand their activities more widely across the region. Here the point is that the abolition of barriers to cross-border equity holdings allows borrowers to raise capital more cheaply and allows investors to earn better returns. Such integration of capital markets also helps promote integration along other lines as well, such as integration of money markets and of markets in goods and services.

Second, equities are increasingly traded on exchanges outside the home country. Trading in equities is a financial service. Much like other goods and services, comparative advantage may dictate that it is more efficient to undertake the trading in a foreign financial center than domestic. The point made above about economies of scale is particularly relevant for financial centers. In the absence of barriers, there is a powerful tendency for financial transactions to be geographically concentrated. The exact reasons for this are not entirely known, given that the financial industry in the age of telecommunications and computer technology is not, like goods-producing industries, affected by shipping costs. The force behind the powerful tendency toward regional agglomeration appears to be the necessity of face-to-face contact in deal-making.[3]

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[1] Caves, Frankel and Jones (1993, 476-477).

[2] The argument is essentially that at the early stages of regional integration, trade creation outweighs trade diversion. There is a rapidly growing literature on the regionalization of the world economy. Frankel and Wei (1995) review the literature, develop the notion of an optimal degree of regionalization that can be justified by natural factors, and consider some dynamic political-economy connections between regional integration and multilateral integration.

[3] Gerd Häusler, of the Bundesbank Directorate, believes that the tendency toward concentration in Europe will be much greater if a new European Central Bank adopts binding minimum requirements for (non-interest-paying) reserves. His argument is that in this case, reserves and interest rates vary little over time. As in Germany currently, monetary policy can take place in "slow motion." The central bank is seldom in a hurry to smooth interest rate fluctuations, and so can conduct open market operations by dealing with hundreds of banks throughout the country in an auction over a period of 24 hours. When banks are not subject to binding reserve requirements, on the other hand, they are always optimizing, in a highly competitive market

It seems likely that the current structure in Europe, where each country has its own financial center (or centers) is inefficient. Steil (1993, p.7) notes, "Compared with the US securities markets, European markets remain highly fragmented. The US has eight stock exchanges and seven futures and options exchanges, as compared with 32 stock exchanges and 23 futures and options exchanges in the EC. In the increasingly competitive environment which is developing at present, some consolidation would appear inevitable, although national exchanges will not face the direct threat of extinction until European monetary union becomes a reality."[4] Integration would put downward pressure on transactions costs, both through competitive pressure on existing national stock markets and through economies of scale in the event of consolidation on a continental level.

One view is that the world is heading toward a system of three big financial centers, one in the Western Hemisphere time zone, one in the East Asia time zone, and one in the European time zone. The first two are clearly New York and Tokyo. Currently the leading financial center in the European time zone is obviously London. In the event that EMU is successfully accomplished, with the United Kingdom on the outside, then an alternative center on the continent would probably develop. London would certainly try to continue to attract business from the continent, perhaps by instituting the practice of quoting European equities in DM or ecus. One advantage that London has is the English language (Grilli, 1989, p.391). Another is that the residents of the continent simply have not developed the habit of holding or trading equities to the same extent as have the Anglo-Saxons. One advantage that Frankfurt has is the site of the European Monetary Institute, and presumably of a future European Central Bank. But Paris is more likely than Frankfurt to compete aggressively with London.

The central question for this paper is whether monetary union, or perhaps some lesser form of currency integration, is a prerequisite for effective integration of equities trading. One might also ask the reciprocal question as to how integration of equities markets in Europe affects the desirability or feasibility of currency integration. The *optimum currency area* literature offers a possible analogy, regarding integration of goods markets or labor markets. Floating exchange rates have both advantages (especially the ability to pursue an independent monetary policy) and disadvantages (the absence of a nominal anchor, and the negative effects of exchange rate uncertainty and misalignments on international trade and investment). The theory of optimum currency areas suggests that if a group of countries or regions are highly open with respect to each other economically, they are likely to be better off by pegging their currencies to each other. Openness can be defined as a high proportion of internationally traded goods (in the McKinnon

environment. Every shock to reserves impacts interest rates. As in the U.K. currently, the central bank must move very quickly. To do so, it must deal with a handful of primary dealers. The conclusion is that if a European Central Bank switches away from a system of binding reserve requirements, there would be a tendency toward financial concentration in a single European financial center. This would presumably be Frankfurt, if that is where the central bank was.

[4] Goldstein and Folkerts-Landau (1993, pp.42-43) note that there is a "tradeoff between the advantages of competition between different market centers ... -- which tends to drive down the costs of transacting and to encourage innovative trading methods -- and the beneficial effects of concentration on market liquidity."

version of the optimum currency area criterion) or as a high degree of labor mobility (in the Mundell version).[5]

An analogous optimum currency area argument for financial markets would say that if a group of countries or regions already engage in a lot of financial transactions, they are likely to be better off pegging their currencies to each other. But it is not clear that the parallel argument really goes through. A high degree of financial openness is known to make stabilizing the exchange rate more difficult. This is true in particular if countries are not prepared to give up all monetary independence. Hence the famous "Impossible Trinity" of open financial markets, fixed exchange rates, and monetary independence.[6] A common view of the 1992 crises in the Exchange Rate Mechanism (common, at least, among American economists) is that the EU tried to achieve the Impossible Trinity, and found it once again to be impossible. In any case, this paper will concentrate on the implications of the exchange rate regime for equity markets, not on the reverse direction of causality. In the concluding section, we will return to the theory of optimum currency areas in an attempt at a broad perspective on the desirability of European monetary integration.

2. What Might be the Role of Currency Integration?

The subject of this paper is the role, if any, of currency integration in fostering the integration of equity markets in Europe. The words "if any" are necessary, because economic theory offers a number of reasons to believe that exchange rates are less relevant to the question of equity market integration than one might think. This is in particular true of such "macro" aspects as the determination of cross-border capital flows and the determination of equity prices and rates of return. Most econometric studies find that exchange rate variability, even when it is large, as it has been among most countries in the 1970s and 1980s, has little effect on the volume or prices of international trade, for example.[7] The usual explanation is that importers and exporters are able to hedge their exchange risk. Why should the same not also be true of borrowers and investors? Indeed, it should be even easier for those who already reside in the financial markets to hedge their foreign currency risk, as compared to some of the smaller importers or exporters, who may not be sophisticated enough to use such financial instruments as forwards and options.

The possible irrelevance of foreign exchange variability holds less for such "micro" aspects as how many financial centers are supported in equilibrium, where they are located, and the volume of trade or profitability of each one. It should be conceded immediately that transactions costs arising from foreign exchange variability, even if relatively small, could easily make a difference in location, by analogy with other transactions costs or turnover taxes.[8] Given the near-indeterminacy

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[5] To the extent that the stabilization of exchange rates is thought to promote trade bilaterally, a currency union is more likely to meet the optimum currency area criterion after it has been in place awhile than ex ante. (In other words, the criterion has a *status quo* bias.)

[6] E.g., Rose (1994) or Caves, Frankel and Jones (1993, 513-514).

[7] Frankel and Wei (1995) find that the effects of bilateral exchange rate variability on bilateral trade were statistically significant in the 1970s, but disappeared after 1980, perhaps due to the spread of hedging techniques. The literature is surveyed in Edison and Melvin (1990).

[8] Campbell and Froot (1994) and Hakkio (1994) show that these make a difference to the

of the location of trading (i.e., there is no strong reason for trading to take place in one place rather than another), even relatively small costs can have a big effect on the possible consolidation of many small trading centers into a few large ones and on the determination of what location is the victor in the race to become the premier financial center of Europe.

The location of trading is irrelevant, in theory, to such questions as the determination of the price of equity or its rate of return. The location is admittedly important to those who do the trading. It may have implications for the magnitude of bid/ask spreads or other transactions costs, if, for example, regional integration of equity trading results in greater efficiency. But transactions costs are already small enough so that the arbitrage, for example, closely equalizes across markets the price of equity in a given company.

3. The Neutrality View

It is probably fair to characterize the conventional wisdom in finance theory with an expression of neutrality: the exchange rate regime has no important implications for equity markets. The extreme form of this neutrality proposition is that currencies have no important implications for <u>anything</u> real, because all nominal magnitudes adjust instantly and proportionately to movements in nominal exchange rates (which in turn only move in proportion to changes in money supply conditions). A much more reasonable form of the proposition is that, even though the level of the exchange rate has implications for variables such as real goods prices, real output, real interest rates, and real equity prices, exchange rate <u>variability</u> does not have major real consequences because exchange risk is diversifiable or hedgeable. We consider each argument in turn.

Many highly abstract theoretical finance models assume that all wages and prices are perfectly flexible, and thereby conclude that movements in nominal exchange rates have no real effects.[9] This may sound absurd on the face of it: a currency depreciation is clearly likely to raise the price of equity in a company that produces for export, for example, relative to the price of another company.[10] These theories, sometimes known as the *equilibrium view*, acknowledge that not all fluctuations in nominal exchange rates are matched by corresponding fluctuations in prices, whether of goods or equities; in other words they acknowledge that of course fluctuations in real exchange rates and relative equity prices occur across countries. But they argue that such fluctuations are due to exogenous causes. This means that they are caused by fundamental shifts in productivity or in consumer demand patterns, and will occur regardless of the exchange rate regime. Under a regime of floating exchange rates, an increase in productivity will cause a real currency appreciation that shows up as an increase in the value of the currency. Under a regime of fixed exchange rates, an increase in productivity causes the same real currency appreciation, but it shows up as in increase in the price level.

These models rely on the proposition that prices of goods and services adjust instantly to

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location and amount of trading.

[9] Examples include Helpman (1981), Helpman and Razin (1979), and Stockman (1983).

[10] The empirical evidence is surprisingly weak on this. Examples include Amihud (1993), Bartov and Bodnar (1994) and Bodnar and Gentry (1993).

exchange rate fluctuations. The reply to the equilibrium view begins by noting that there is abundant evidence that prices of goods and services are sticky in the currency of the country of production. One convincing kind of evidence is that real exchange rates are always more variable under regimes of variable nominal exchange rates than under regimes of stable nominal exchange rates.[11]

Proponents of the equilibrium view, even when conceding that the price-flexibility proposition is only an approximation, might adopt as a fallback position the point that prices in *financial* markets *are* completely flexible and free to adjust. This point is correct, so far as it goes. But it certainly does not then follow that exchange rate fluctuations do not have real effects on equity prices. To the contrary, it follows from price stickiness that exchange rate fluctuations, even if purely monetary in origin, have effects on real exchange rates and real interest rates. It also follows that there are in turn effects on real equity prices. A mechanism operating via the real interest rate, if nothing else, will bring this about: A monetary contraction that causes an increase in the real interest rate and in the real value of the currency, will reduce the price of equity (the presented discounted value of future dividends) in terms of domestic currency or goods, even while raising it in terms of foreign currency or goods. Other effects follow more directly from the fluctuation in the real exchange rate itself. A currency depreciation will raise the equity value of companies in domestic terms when their products gain competitiveness on world markets in terms of price or unit labor costs.

The proponents of the equilibrium view repeat that, even so, if the government suppresses fluctuations in the exchange rate, then the fluctuations will simply show up elsewhere. For example, if the central bank responds to fluctuations in the demand for money by buying and selling unwanted currency, rather than by letting the exchange rate respond to clear the market, then the fluctuations will show up in the money supply and the interest rate. The rebuttal admits that this is often true to a certain degree, but points out that there is no reason to expect complete invariance in real equity prices. In particular, there is some evidence that floating exchange rates are sometimes characterized by "excess volatility" in the form of speculative bubbles.[12] Perhaps the excess volatility could be reduced or the speculative bubbles suppressed under a regime of target zones or fixed exchange rates.[13] In that case, the eliminated volatility need not show up anywhere else.

Later in the paper, we consider some new evidence on the proposition that relative equity prices are neutral with respect to exogenous exchange rate movements. We will find some evidence that this proposition is wrong, that relative equity price movements are affected by the degree of variability in the exchange rate.

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[11] The evidence is reviewed in Part II of Frankel and Rose (1995). An important example is the paper by Mussa that is described in Section 6 below.

[12] Examples include Dornbusch (1982), Frankel (1993b), Goodhart (1988), and Meese (1986).

[13] E.g., Rose (1994), Krugman and Miller (1994) and Williamson (1985). A contrary argument is that speculators can generate movements that are excessive [in the sense of being unrelated to economic fundamentals], not only under floating rates, but under pegged exchange rates as well, as in the speculative attack model of Obstfeld (1986).

The more reasonable form of the neutrality proposition recognizes that the *level* of the exchange rate has implications for real variables, but argues that exchange rate variability does not have major consequences for the degree of market integration, because exchange risk is diversifiable or hedgeable. That it can be hedged, at relatively low transaction cost, is clear. Anyone holding French assets, for example, can easily sell French francs forward, to hedge against the risk that the franc will depreciate. The question is whether one must pay a substantial *exchange risk premium* for the privilege of eliminating the risk, defined as a forward price of francs that lies below the expected future spot rate. Anyone who wishes to protect his home from the risk of an earthquake by taking out earthquake insurance, or to protect his portfolio from the riskiness of equities themselves by holding bonds instead, must give up quite a bit of money in expected value terms in return for laying off the risk on someone else. Should not the same principle apply to the forward exchange market? If so, the exchange risk premium should be smaller under a regime of fixed rates or target zones than under floating, because exchange rate uncertainty is smaller. It would then follow that variable exchange rates can discourage cross-border equity investing, and exchange rate stability can promote it.[14]

There has been a lot more research on exchange risk in the context of markets in bonds, bills, and deposits, than in the context of equity markets. Many of the conclusions are ambiguous, but the general point is that exchange rate uncertainty can prevent perfect arbitrage. An exchange risk premium can separate one country's interest rate from another's. The analogous result could carry over to equity markets in two ways. (1) There could be an analogous exchange risk premium in equity returns, because equity prices are tied to local currencies, in the way that bonds are, even though to a much smaller extent. (2) The existence of extra frictions in international equity markets (e.g., regulatory barriers and information costs that don't apply to highly-rated bonds) could mean that the most effective way of arbitrage across equity markets is via the fixed-income market: arbitrage by domestic investors equates the expected rate of return on domestic equity with the domestic interest rate (plus an equity premium), arbitrage by international investors equates the domestic interest rate with the foreign interest rate (plause an exchange risk premium), and arbitrage by foreign investors in turn equates the foreign interest rate with the expected rate of return on foreign equity (again, plus an equity premium). The middle step on this route of arbitrage would then be impeded by exchange rate risk.

There is good reason to believe that the exchange risk premium is considerably smaller than the earthquake insurance premium or the equity market premium [the average rate of return on equities minus the treasury bill rate]. The reason is that much of exchange risk is diversifiable. For every Englishman who wishes to lay off the exchange risk he incurs from holding French assets, by selling francs in the forward market for pounds, there is likely to be a Frenchwoman who

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[14] The possibility has been suggested that exchange rate volatility might actually constitute an *inducement* to greater volume of cross-border capital flows on the part of speculators who thrive on volatility. This is too cynical a view, even for a skeptic of market efficiency. Exchange rate volatility is very likely an inducement to greater volume of turnover in the foreign exchange market, but not in general to greater volume of flows of securities. Bank trading rooms may like volatility, but corporate treasurers do not.

wishes to lay off the exchange risk she incurs from holding British assets, by selling pounds in the forward market for francs. There is no reason why the rate that clears the forward market need lie above or below the expected future spot rate. In other words, there is no reason why the exchange risk premium need be positive or negative. It is in theory possible that all exchange risk is diversifiable, in which case the exchange risk premium is zero, and exchange rate uncertainty need not discourage cross-border holding of securities.[15]

It is more likely that the balance of buyers and sellers will go in one direction or the other than that the forward market will clear at an exchange risk premium of exactly zero. The logic of diversifiability still argues that the premium is likely to be relatively small. The logic also suggests that to hedge equities held in a foreign country, international investors need not even incur the bother or transactions costs of dealing with the futures market. (It should be noted that forward contracts as yet tend not to go out to horizons much beyond one year, and the theoretically correct strategy of rolling over short-term forward contracts can be expensive.) If investors reduce their holdings of bonds in that foreign country, relative to what they would otherwise hold, it will have the same effect as selling a like amount of foreign currency forward. Of course, this only works if the investor was otherwise planning on holding foreign bonds.

Nevertheless, to say that exchange risk is largely diversifiable or that the exchange risk premium is relatively small is not to say that risk does not matter at all. Even a relatively small premium could discourage cross-border equity holdings. Some research argues that the exchange risk premium is substantial, despite the arguments above.[16] In that case it would follow that exchange risk creates obstacles to capital market integration.

4. The home-country bias puzzle, and other evidence of currency myopia

In practice, there are reasons to believe that exchange rate fluctuations, even if purely monetary in origin, have effects on relative equity prices and return differentials. Most of the remainder of this paper is dedicated to demonstrating this proposition empirically. Prices of plant and equipment are sticky in home currency price, much like prices of real estate. Part of the explanation is probably that the prices of the goods that the plant produces are sticky, and the value of the plant is related to the value of the goods it produces, since capital is not easily substitutable among different uses once it has been embodied in the form of a factory.

There are also reasons to believe that the risk and expense of dealing in foreign currencies, while not large enough to deter an investor who believes that substantially higher returns are to be had abroad, may nevertheless be large enough to have some deterrent effect for the typical investor. Institutional investors such as pension funds and life insurance companies may be prohibited by law or by their own guidelines from holding foreign-currency assets altogether, or from holding more than a certain proportion of their portfolios in that form. Fear of derivatives, based on lack of knowledge and the publicity surrounding recent scandals, may currently inhibit some funds from

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[15] Frankel (1979, 1982). Perold and Schulman (1988) on similar logic offer currency-hedging to international equity holders as a "free lunch". [While Perold and Schulman advise investors to hedge their exchange risk, Froot (1993) comes to a somewhat different conclusion, for the case of investors who have long horizons.]

[16] E.g., Hodrick (1988) and Frankel and Chinn (1993).

legitimate hedging of currency risk, and thereby inhibit them from holding foreign-currency assets in the first place. Foreign-currency assets are still much harder for the small investor to obtain from a broker than domestic assets. Mutual funds are clearly the easiest way for individual investors to diversify abroad. But international mutual funds have expense ratios that are considerably higher than those for domestic mutual funds. The funds themselves cite the risk and expense of dealing in foreign currencies as one of the major reasons for their high expense ratios.

Furthermore, investors appear in some ways to exhibit a sort of currency myopia, a reluctance to hold equities that are transacted in foreign currencies. Given the ability to hedge exchange risk, this reluctance seems to exceed what can be justified under the standard hypothesis that markets are efficient.[17] Such a failure of market efficiency does not necessarily mean that people are irrational. There are a number of institutional peculiarities and frictions that can explain the phenomenon.

Most well-documented is the famous puzzle of "home-country bias" in equity investing. Investors who reside in different countries are thought to exhibit a bias toward holding home assets. French and Poterba (1991), Golub (1991), and Tesar and Werner (1992) find that there is such a bias in portfolios actually held, notwithstanding the widely noted progress already made in recent years toward the globalization of equity markets. In 1989, U.S. investors reportedly held 94 per cent of their stock-market wealth in domestic stocks, Japanese investors held 98 per cent, and U.K. investors held 82 per cent. In 1990, pension funds in G-7 countries continued to hold more than 90 per cent of their assets domestically. Why do they not each hold more of each others' equities?[18]

One can readily explain a substantial home-country bias in investors' holdings of short-term bonds, as opposed to equities. The explanation is rational preferences for local currency habitats. Assume a simple model of investors' portfolio allocations based on one-period mean-variance optimization (which is the CAPM). Assume further that goods prices are predetermined in the currency of the country where the good is produced, over a horizon as long as the maturity of the bond. Calculating the optimal portfolio for a given investor, even approximately, is very difficult because of sensitivity to expected rates of return, which are difficult to measure precisely. Calculating the *difference* between optimal portfolios held by domestic and foreign residents is much easier, however, assuming that both share the same expectations (and, for simplicity, the same coefficient of risk-aversion). The reason is that the expectations component of the optimal portfolio share drops out of the difference.

Let x_A be the share of their portfolio that Americans allocate to U.S. assets and x_G the share of their portfolios that Germans allocate to U.S. assets. Then it can be shown that

$$x_A - x_G = [a_A - a_G][1 - 1/\gamma_0],$$

where a_A and a_G are the shares of their consumption that optimally-diversified American and

German residents, respectively, allocate to U.S. goods, and γ_0 is the coefficient of

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[17] On efficiency in the context of international capital markets, see Steil (1992) or the contributions in Frankel (1994).

[18] Frankel (1994). Recent surveys by Dumas (1993) and Obstfeld (1993) each devote sections to this observed bias and its possible explanations.

relative risk-aversion.[19] Intuitively, to the extent that investors

are relatively risk-averse ($\gamma_0 > 1$), they differ in their portfolio preferences in simple proportion to how they differ in their consumption preferences. The more they consume of their own country's goods, the more do they view their own currency as safe in real terms, and the foreign currency as risky. In short, a home-country bias in consumption preferences implies a home-country bias in portfolio preferences.

The term representing the home-country bias in consumption, a_A - a_G, is certainly large in practice. Assume for simplicity that it takes its maximum value of 1-0 = 1. (In other words, Americans consume only U.S. goods and Germans only German goods.) Let us try a value for the coefficient of risk-aversion that emerges from Engel's (1994) CAPM estimates: 4. It follows that the measure of home country bias is relatively large: x_A - x_G = .75. If residents of each country in fact hold a mere 10 or 15 per cent of their portfolios in foreign bonds (.85-.15 = .70 < .75), that is fully consistent with optimal diversification! At first glance, home country bias poses no puzzle.

The puzzle arises in a portfolio that includes equities. We will see below that the return on equities in the currency of the home country has a surprisingly low correlation with the exchange rate. The key point is that exchange rate risk is not an impediment to holding foreign equities in the way that it is an impediment to holding foreign bonds. Once investors have given vent to the home-country bias that optimally follows from differences in consumption patterns, in the form of bond portfolios that are relatively undiversified, there is little reason for their equity portfolios to exhibit the same home-country bias. Rather, in theory, American investors should take advantage of the opportunity to diversify by holding approximately the same amount of German equities as German residents hold. They can easily eliminate the gratuitous exchange risk by reducing their holdings of German bonds correspondingly or, equivalently, by selling marks on the forward market. (As already noted, the prescription to hold foreign equities but hedge the exchange risk has been offered to portfolio-managers as a "free lunch.")

Clearly, investors' equity portfolios are in fact less diversified than this. In a framework that allows investors of each country to diversify among countries' stocks and bonds as they will, rejection of the CAPM constraint might be attributed to its implication that investors should exhibit home-country bias only in their bonds, not in their stocks. Tesar and Werner (1994) infer that there is a significant home country bias puzzle -- which cannot be explained by transactions costs -- from their evidence that investors trade a lot on the small fraction of the portfolio that they dedicate to foreign assets. They find that gross transactions volumes are very large compared to the magnitude of the corresponding net transactions volume.

The existence of a home country bias need not necessarily be due to currency myopia, of course. One alternative hypothesis is that investors in each country feel that they have better information on domestic equities than foreign equities. But there is evidence that currency myopia does play a role. We discuss the cases of FASB 8 and country funds, before turning to a statistical

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[19] One of many possible citations for the derivation of this equation is Frankel (1983), equations (1) and (3).

analysis of the exchange rate and equity price data in subsequent sections.

If corporate managers do not have confidence that their shareholders can see through all the complexities of modern finance and accounting, they may be reluctant to make an investment that does not "look good on the books" even if they believe it is in the true interest of the company. To take an example, in 1976 the U.S. Financial Accounting Standards Board adopted a rule, FASB 8, requiring companies to translate their overseas earnings into dollars at the current exchange rate. Many companies reacted by suddenly altering their behavior so as to reduce exposure in foreign currency. They knew that such exposure would show up on their annual reports as earnings that were highly variable in terms of dollars. They sought to hedge their foreign earnings -- for example, by selling foreign exchange on the forward market.[20]   While some hedging may always be prudent for a company with large overseas operations, in this case the change in corporate behavior in response to FASB 8 was a sign that managers did not think that shareholders would see through the accounting rule change. Such managers may err in the direction of the simple rule that the domestic currency is safe and the foreign currency is risky.

The second case, which is especially difficult to reconcile with standard notions of market efficiency, arises from closed-end country funds. It is always difficult to test whether the market price of a stock is equal to its fundamental value, because of the uncertainty regarding what is the correct model of the fundamental value. There is little doubt, however, that the market price of a fixed portfolio of equities ought to be equal to the net asset value of the portfolio, that is, the aggregate of the market prices of the individual stocks. Closed-end country funds are just such fixed portfolios, and yet their prices when traded in New York or London are observed to differ substantially from their net asset values (the aggregate value of the basket of equities at local market prices) expressed in dollars or pounds.

A number of authors have observed the discrepancy between country funds and their respective net asset values.[21]   Hardouvelis, La Porta, and Wizman (1994) study how it moves through time. To summarize briefly the outcome of a systematic and thorough analysis, the New York prices of country funds are observed in the short run to behave far more like the New York prices of other U.S. securities than to behave like the aggregated net asset value of the individual foreign securities that constitute the portfolio. Specifically, when there is a fluctuation in the exchange rate between the dollar and the currency of the local country in question, the country fund price tends in the short run to follow the dollar, not the local currency. When there is a fluctuation in the price of the world stock market, or in U.S. stocks, again the country fund price tends in the short run to follow the world portfolio or the U.S. stocks, not its respective local national stock market. Only slowly over time does the price converge to the net asset value as it should right away. (The weekly autoregressive coefficient is estimated at .89, for a half-life of five weeks.) It is difficult to reconcile this behavior with the hypothesis of an efficient and frictionless world capital market. It seems to be clear evidence of currency myopia on the part of investors.

5. Correlations of Stock Markets Across Countries

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[20] Revey (1981).   Incidentally, the rule has since been abolished.

[21] For example, Bosner-Neal, Brauer, Neal and Wheatley (1990) and Diwan, Senbet and Errunza (1993).

The correlation of countries' stock markets is rather low on an absolute scale. This fact, which has been widely documented, is the basis for the longstanding advice from international economists that great gains await the investor who decides to diversify his or her portfolio internationally. Standard asset-pricing theory -- in the form, for example, of the famous Capital Asset Pricing Model (CAPM) -- tells us that an investor can minimize the risk to his or her overall portfolio, for a given expected return, by diversifying among assets that have a low correlation. This is why a low correlation among international equities implies gains to diversification.[22]

Countries' stock markets have over time become more highly correlated. The tendency for markets to fall sharply on the same day, such as the crash of October 19, 1987, has been widely noted.[23] Co-movements as a phenomenon occur more generally than just the occasional spectacular crashes, however.

Of stock markets in 16 industrialized countries, 13 experienced an increase in correlation with the aggregate world portfolio between the period January 1959-December 1970 and the period January 1971-December 1978. Only Canada and the United States experienced declines in their correlation with the world portfolio.[24] Of the 16, 12 experienced an increase in their correlation with Germany's stock market in particular. Such European countries as Belgium, Denmark, France, the Netherlands, and Spain became far more correlated with Germany. Again, Canada, the United States, and Italy are the only exceptions.

Of 18 national stock markets, 12 experienced a further increase in correlation with the world portfolio when moving to the period January 1979-December 1986.[25] The correlation was to a degree concentrated in Europe. During the period January 1971-December 1978, the correlation among 66 pairs of European countries averaged .419, and among 28 pairs of EC countries as high as .433, as compared to only .346 for 87 other pairs of countries. During the period January 1979-December 1986, the intra-European correlations averaged .417 and the inter-EC correlations averaged .439, while the correlations among other pairs of countries on average actually fell to .320.[26]

The salience of the intra-European links has been amplified more recently. During the

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[22] Early contributors to this literature were Levy and Sarnat, 1970, and Solnik, 1974. Adler and Dumas, 1983, surveyed the early literature. More recently, Grauer and Hakansson, 1987, and Jorion, 1989b, have updated the estimates.

[23] E.g., Eun and Shim (1989), King and Wadwhani (1990), von Furstenberg and Jeon (1989), and Ito and Lin (1994).

[24] This may be because Canada and the United States themselves constituted a large fraction of the world portfolio in the 1960s, and less so in the 1970s. Italy experienced no change, to two digits. These figures are derived from statistics in Jorion (1989), Tables 2-4.

[25] Five countries experienced declines in correlation -- Australia, Belgium, Hong Kong, Norway, Singapore -- and the United States experienced no change. Between the 1971-78 period and the 1979-1986 period, eight countries became more highly correlated with Germany and nine less. The split is even among the European countries.

[26] These calculations are based on numbers reported in Jorion (1989a), Tables 26-3 and 26-4.

interval April 1988-March 1991, correlations among 91 pairs of European countries averaged .488 and among 36 pairs of EC members as high as .541, while correlations among 185 other pairs of countries averaged as low as .228.[27] Steil (1993, p.7-8) notes continued convergence of European equity market returns during the period 1987-1991, despite a setback in 1992 that was presumably temporary.[28]

The interesting questions are (1) why have the correlations within Europe been higher than in the rest of the world? and (2) why have the correlations increased over time? There are (at least) three leading categories of explanation, all of which probably play a role in explaining correlations worldwide, as well as within Europe.

First, the existence of capital controls, transactions costs, and other barriers to the free movement of capital across national boundaries could explain the low correlation initially, and a reduction of these barriers since 1971 could explain the increase in the correlation.[29] Investors are now more free to arbitrage across national boundaries when they see higher expected returns in one market than another. By responding to such return differentials, they increase the demand for securities in the high return countries, thereby driving down the required rate of return there, and decrease the demand for securities in low-return countries, thereby driving up the required rate of return there. In this way, they act to bring rates of return across countries more nearly in line with each other.

Second, industry composition is different in different countries. If there are fluctuations in the price of oil and natural gas, for example, a stock market index for Norway will fluctuate relative to Germany. This explains a low correlation across countries, but does not explain an increase in the correlation over time. Indeed, in the case of energy prices, they have certainly been more volatile since 1971 than previously. But an increase in the international integration of goods markets, in the form of reductions in tariffs, non-tariff barriers, and transportation costs might be able to explain it. An increase in correlation might be explained by arbitrage on the part of consumers, who are now better able to substitute among products of different countries. This is particularly true if one thinks in terms of industries disaggregated into individual commodities, and the commodities disaggregated into individual brand names. If consumers are better able to substitute between Mercedes and Lexus, then equity holdings in Daimler-Benz and Honda become closer substitutes as a result.

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[27] These calculations are based on numbers reported in Roll (1992), table 7.

[28] Those returns are expressed in local currency. Steil also notes earlier econometric research on European excess returns that shows a strong correlation with U.S. excess returns.

[29] Among the many sources on the nature of barriers to international capital movements, and the progress made at removing them, is Frankel (1991). Tests of short-term arbitrage suggest that the most rapid rates of liberalization in the 1980s were recorded (in order) by: Portugal, Spain, France, Denmark, Italy, Germany, Switzerland, and the Netherlands. Austria, Belgium and the United Kingdom already had low barriers at the beginning of the sample period (1982). Frankel (1994), and the accompanying papers, investigates similar trends for equity markets.

Third, an industry within a given country shares some things with other industries in that country which it does not share with firms in the same industry in other countries. They share the same macroeconomy, and particularly the same currency. Since the Bretton Woods system of exchange rates ended in 1971, exchange rates have become more variable worldwide. Within Europe, however, the pattern is different, as the statistics show.

Table 1 shows that exchange rate variability among pairs of countries worldwide rose sharply in the mid-1970s, and rose further in the 1980s. Of 1770 pairs of countries, the standard deviation of monthly exchange rate changes was 1.9 per cent during 1969-70. [This means that monthly changes as large as 3.8 per cent occurred (five per cent of the time, assuming a log normal distribution for exchange rates).] This measure of variability almost doubled during the period 1974-75, and then doubled again during the period 1989-90. The variability pattern for the *real* exchange rate (i.e., adjusted for price levels) was similar.

Among 11 members of the European Community, on the other hand, bilateral exchange rate variability (that is, vis-a-vis each other) <u>fell</u> during the 1980s, as the table shows. The standard deviation was 1.8 per cent in 1974-75, after the end of the Bretton Woods regime but before the founding of the European Monetary System. It declined to 1.0 per cent in 1989-1990. Regression estimates can determine the implicit weights placed on major currencies, particularly for countries like Sweden and Thailand that have in the past measured their currency values in relation to a basket (whether loose, informal relationships or tighter formal pegs). Such tests confirm that the mark is dominant for European countries, while the dollar is dominant for Pacific countries.[30] The increase in the correlation of equity prices across European countries might be associated with the stronger links among their currencies.

The problem is that the other factors mentioned above are also particularly relevant within Europe. There has been a fairly steady process of reduction in barriers to financial integration among European countries since 1973.[31] Trade liberalization has also progressed more rapidly among European countries than between them and the rest of the world.[32] The macroeconomic factors have changed over time as well.

In an important recent paper, Heston and Rouwenhorst (1994) investigated the reasons for differing movements in equity prices across 12 European countries between 1978 and 1992. They tested the role of industrial structure, using disaggregated data on the actual equity returns of

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[30] Frankel and Wei (1995).

[31] There are many references documenting this process for Europe. They include: Artis and Taylor (1990), Eijffinger and Lemmen (1994, 1995), Frankel, Phillips, and Chinn (1993), Giavazzi and Spaventa (1990), Grilli (1989), and Wyplosz (1986).

[32] The high level of intra-European trade is not in itself necessarily evidence of the effect of the formation of the European Community or other preferential trade policies; much of this trade can be explained by such natural factors as the proximity and size of the European economies. However a careful gravity-model analysis does show that intra-European trade increased rapidly in the 1980s even after holding constant for these other factors (Frankel and Wei, 1995).

individual sectors.[33] Heston and Rouwenhorst found that industrial structure explains very little of the cross-sectional difference in country return volatility. Low correlation between country indices is rather due almost completely to country-specific sources of return variation. This paper is important because it seems to eliminate the second of the three hypotheses listed above.

Macroeconomic disturbances, shared by all the firms within a country but shared much less completely across countries, are the natural explanation for the Heston-Rouwenhorst finding. Currency fluctuations are a major example of such macroeconomic disturbances. Heston and Rouwenhorst conclude that currency fluctuations can explain only a small component of the variation in country-specific return variation, between 1 per cent for Sweden and 25 per cent for the United Kingdom. But these estimates seem large enough to be interesting. Furthermore in most cases the authors cannot reject the hypothesis that the country effects measured in *local* currency are uncorrelated with the exchange rate movements. This null hypothesis is the same as the proposition that currency-adjusted equity returns vary one-for-one with exchange rate fluctuations.[34]

The greatest difficulty in evaluating whether or not exchange rate volatility causes variation in equity return differentials is the usual difficulty in inferring causality from observed correlation. A great many causal connections are possible, some of which would lead one to expect positive correlations between exchange rates and equity prices, and some negative.[35] It is easy to show that exchange rates and international differentials in stock prices are related. Table 2 shows the results of regressing currency-adjusted movements in relative equity prices against exchange rate changes. If exchange rates were utterly irrelevant to the determination of relative stock prices, there would be no statistical relationship. As it is, the coefficient is always negative, and usually significant at the 99 per cent level. But what is the reason for this relationship? One possibility is that the exogenous disturbances involve generalized portfolio shifts among countries' assets. If investors lose confidence in a country's assets, for example, in response to poor prospects for economic growth, this should result in a simultaneous decline in the value of the currency and in the value its equities, even when expressed in domestic currency.[36] This explanation is consistent with those

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[33] Roll (1992), by contrast, tried to address this problem with aggregate stock market indices, relying on data on the weights of different sectors in various economies.

[34] Given the high levels of volatility in both the equity and foreign exchange markets, one should not be surprised if the power of tests is low, and one should not conclude too much from the failure to find an effect. But if one finds an effect of exchange rate movements on currency-adjusted returns (even if a small one), and none on local-currency returns, that seems to suggest that exchange rate variability may play an important role in determining international return differentials.

[35] Roll (1991, pp. 27-28, 38), for example, claims that causality may lead from equity prices to exchange rates as follows: a shock adversely affecting a country's producers causes the monetary authorities to vary the exchange rate in response.

[36] If the exogenous disturbance is a change in the real interest rate, on the other hand, the effect on the value of the domestic currency should be *opposite* to the effect on equity prices in domestic currency. Another possibility is that exogenous disturbances involve changes in expected inflation, though the effect on nominal equity prices is in this case unclear (depending on various

cases, e.g., Spain in Table 2, where the coefficient is not only greater than zero in absolute value, but is also greater than 1.

The best case in favor of stabilizing exchange rates within Europe would be if floating exchange rates regularly exhibited "speculative movements" that (i) were unrelated to fundamentals, (ii) had real consequences, and (iii) were thought likely to disappear under fixed exchange rates or a target zone.[37]   The sort of real consequence that an exogenous speculative drop in a currency value might have would be to raise the price competitiveness of the country's firms on world markets, and thereby increase the domestic currency value of the firm's equity, by an amount that is not fully proportionate to the change in the exchange rate. (The case where the change is fully proportionate is the case where there are no real effects.) The results in Table 2 are not inconsistent with this hypothesis. The trouble, as noted, is that the results are also consistent with a great many other hypotheses.

6. How Can We Tell if the Correlation Between Currency Variability and Equity Price Variability is Causal?

We noted earlier that equity prices have become more highly correlated among European countries, over the same period of time that policy-makers have sought to stabilize the value of European currencies in terms of each other through the Exchange Rate Mechanism and other measures. But the case of European integration is clearly an instance of the causality problem. A high degree of economic integration between two countries is likely to show up both in the form of links between their equity prices and links between their currencies. How are we to know that the greater degree of intra-European exchange rate stability under the European Monetary System, compared to the years 1971-79, contributed to a higher correlation among equity prices in a causal sense? Could it not be that a higher degree of political and economic integration overall (e.g., integration of goods markets through removal of trade restrictions), raised both the currency correlation and the equity price correlation?

The evolution of European monetary arrangements over the last few decades offers some natural experiments for getting a handle on the question of a causal relationship between exchange rate variability and equity markets. There is an analogy here with some very interesting tests of the causal relationship between nominal exchange rate variability and real exchange rate variability. Many economists have observed that nominal and real exchange rate movements tend to be highly correlated. The usual interpretation is that goods prices are "sticky" in domestic currency, so that nominal exchange rate changes cause real exchange rate changes. It might follow that if nominal exchange rate variability could be suppressed under a fixed-rate regime, that real variability could be suppressed as well. Skeptics, however, have argued that real exchange rate variability is caused

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tax and accounting issues, for example).

[37] Williamson (1985) asserts that speculative bubbles would be less likely to develop under target zones. Until recently there has been little basis for such an assertion, other than intuition, but Krugman and Miller (1993) now offer some theoretical support and Rose (1994) some empirical support.

by real shocks (e.g., changes in productivity or in consumer demand patterns), and that these shocks will show up either under a regime of fixed exchange rates (as fluctuations in price levels) or under a regime of floating rates (as fluctuations in the exchange rate). Statistical analyses such as those undertaken by Mussa (1990), comparing across regimes, convincingly refute the skeptics.

Mussa demonstrated that nominal and real exchange rate volatility are both substantially lower during regimes of fixed rates and higher during regimes of flexible exchange rates. Persuasive examples include the Canadian experiment with floating in the 1950s, and changes in Ireland's exchange rate regime from a pound to a Deutschemark peg. Eichengreen (1988) provides similar evidence from the interwar period. In every case, exogenous exchange rate variation appears to have effects on variation in currency-adjusted relative goods prices.

Here we propose an analogous experiment for equity prices. To be sure, equity prices are determined in markets that come far closer to satisfying the classical market paradigm than do the prices of most goods and services. Equities in a given company are homogenous, non-perishable, and traded in relatively competitive markets with freely-determined prices. Nevertheless, we are willing to consider a number of hypotheses under which equity prices might appear to be slightly sticky in their home-country currency, in the sense that exogenous exchange rate fluctuations might have an effect on currency-adjusted changes in relative equity prices. In the first place, if goods prices are sticky in domestic currency, it is reasonable to suppose that the prices of capital equipment dedicated to producing these same goods might behave similarly. In the second place, institutional details of accounting and taxes might work to tie equity prices to the domestic currency. Third, as noted in Section 4, there may be an investor-clientele effect (equities are known to be held disproportionately by domestic residents) that ties their prices to prices of other same-country assets.

7. A Natural Experiment: The Case of Ireland

The cleanest experiment is offered by the case of Ireland, because it has experienced a number of clear-cut changes in regime vis-a-vis major currencies, the effects of which are not likely to be confused with the effects of gradually increasing economic integration. Table 4 reports the statistics.

The first regime change occurred in 1971 with the break-up of the Bretton Woods system, when the link between the Irish pound and the dollar was broken (along with other currencies, of course). The first line of Table 4.3 reports how much the variance of the Irish exchange rate against the dollar went up subsequently, and Table 4.4 shows the same thing in terms of the variance of the *change* in the exchange rate. (Our discussion will henceforth focus on the variability of first differences, rather than levels, in part because of nonstationarity concerns.) If exchange rate variability were irrelevant, then there should be no effect on the variation in Irish equity prices (currency-adjusted) vs. U.S. equity prices. Yet the first line of Table 4.5 shows that the variance of the price differential (Irish equities vs. U.S., exchange rate adjusted) increased after 1970 as well.

One must recognize that the world became a more volatile place in the 1970s (e.g., oil price shocks). Other measures of real variability went up as well, including share price vis-a-vis the United Kingdom despite the fact that Ireland remained pegged to the pound in the 1970s. So this

first experiment is not a particularly convincing one.

The Irish currency remained pegged to the British pound in the 1970s; the second columns of Tables 4.3 and 4.4 show that exchange rate variability vis-a-vis the pound remained at zero, while the variability vis-a-vis the dollar and mark were sharply higher. The corresponding second column of Table 4.5 shows that the variance of the Irish equity price differential vis-a-vis U.K. equities remained lower than the equivalent variabilities vis-a-vis U.S. and German equities. The second column of Table 4.6 shows the same thing with a different statistic: The correlation of Irish equity prices with U.K. equity prices in the 1970s remained higher than the correlations with German equity prices. These statistics are consistent with the hypothesis that the Irish currency link with Britain fostered a link between the Dublin and London equity markets. The statistics, however, are also consistent with the hypothesis that the Irish economy is integrated more closely with the British economy than with the American or German economies.

The evidence starts to become convincing with the second regime change, at the time of the formation of the European Exchange Rate Mechanism (ERM) in 1979. Ireland jumped ship, abandoning its peg to the United Kingdom and instead tying its currency (now called the punt) to the ERM. Table 4.4 shows, as one would expect, that the variability of the punt/pound exchange rate rose sharply in the 1980s (from 0 previously), while the variability of the punt/DM rate fell sharply (not to zero, under the terms of the Exchange Rate Mechanism, but to a level much lower than the variance of the punt/pound rate). The third columns of Table 4.5 and 4.6 show that *Irish equity prices in the 1980s became more highly correlated with German equity prices than with British equity prices*. This experiment is fairly convincing, because of the sharp contrast with the 1970s: the switch in equity market links neatly follows the switch in currency links. Ireland may have experienced a bit of financial market opening during this period.[38] But this would not explain closer financial integration to Germany than to Britain. The same applies to any consequences of goods market integration under the European Community. We thus have one piece of evidence that currency links may help foster equity market links.

The next regime change occurred in October 1990, when Britain joined the ERM as well (albeit with wide bands, at +/- 6 per cent). This regime lasted until the ERM crisis of September 1992, when Britain was forced to drop out of the arrangement. During the period November 1990-August 1992, variability in the punt/pound exchange rate was sharply lower than during the period April 1979-October 1990, as a comparison of columns 3 and 4 in Table 4.4 shows. What pattern do the equity prices show? Comparing the analogous entries in Table 4.5, the variability of the equity price differential vis-a-vis Britain fell (relative to the 1980s, and also relative to the differentials vis-a-vis the United States and Germany, presumably reflecting that the Irish economy is indeed more closely linked to the British economy). Comparing the analogous entries in Table 4.6 gives the same answer: Irish equity prices became more highly correlated with British equity prices during the period that the pound was in the ERM. This constitutes a second clear data point

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[38] Ireland was one of several countries that was given an extension on the 1990 deadline for full capital market liberalization agreed to by most members of the European Community. Tests of interest parity conditions in the money market show some possible signs of liberalization in Ireland during the 1980s, but much less than most other European countries: Eijffinger and Lemmen (1994, 1995), Frankel (1991), and Frankel, Phillips, and Chinn (1993).

in support of the hypothesis that currency links are causally related to equity market links.[39]

Another way of stating the hypothesis that exchange rate variability affects relative equity prices (currency-adjusted) is that relative *nominal* equity prices do not adjust to offset exchange rate fluctuations fully. We have used the word sticky to describe this hypothesis. An extreme form of the hypothesis would be that relative nominal equity prices do not adjust to offset exchange rate fluctuations *at all*. It would be quite surprising if this extreme proposition were true. Even in a "sticky-price" view of the world, an exogenous depreciation increases a firm's nominal value by raising the domestic-currency value of its overseas earnings and by increasing the price-competitiveness of its domestic output on world markets. Nevertheless, simple regressions in Table 3 of European local-currency equity prices against the prices of foreign currency show coefficients that are seldom positive, and are sometimes negative for some countries. This probably reflects the common effect that adverse economic news has on a country's equities and currency at the same time, rather than the exogenous effect of an exchange rate change. It is worth testing the form of the hypothesis in the context of clear-cut regime changes.

Table 4.2 reports statistics on the correlations of Irish nominal equity prices with those in the three major foreign countries. In the case of each of the five experiments described above, the sign of the comparison of nominal equity price correlations is the same as the sign of the currency-adjusted equity correlations discussed above. When the United Kingdom joins the ERM in 1990, for example, local Irish equity prices (in punts) once again become more highly correlated with local U.K. equity prices than with U.S. or German equity prices: there is no longer a major exchange rate barrier intervening between Ireland and Britain. Thus the extreme form of the hypothesis does not hold. Table 4.2 is no reason to discount the earlier evidence that the exchange rate regime has real implications for equity markets. It suggests that the equity markets have some ability to pierce the currency veil, not that they see through the veil as if it were not there.

8. The Experiment for Other European Community Members

The Irish case offers some persuasive bits of evidence. But in the absence of any formal hypothesis-testing, one would like to have more evidence. We now consider regime changes for a broader set of European countries.

With the break-up of the Bretton Woods system, the currencies of France, the Netherlands, Belgium, and Denmark all experienced an increase in exchange rate variability vis-a-vis the dollar. Variability vis-a-vis the dollar rose above the level of variability vis-a-vis the DM, to which they were tied (intermittently in some cases) under the Snake arrangement that lasted until 1979. [The same was true of Luxembourg and Portugal, but we lack the equity market data for the 1960s to conduct the experiment for them.] The variances are reported in Table 5. Variances of changes in the exchange rates are reported in Table 6. In the cases of each of these four northern European countries, the variability of their stock prices (currency-adjusted) vis-a-vis the United States also

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[39] The final regime one might wish to consider is September 1992-January 1995, when the pound had dropped out of the ERM, and the punt/pound exchange rate became more variable, as in the 1970s. The second row of Table 4.6 shows that the U.K. equity prices became more correlated with Irish prices (currency-adjusted) during this period, which tends to support the hypothesis. The variance criterion in Table 4.5, however, shows the reverse.

increased, while the variability vis-a-vis Germany either fell or, in the case of France, rose by less than vis-a-vis the United States. The variances of the currency-adjusted equity prices are reported in Table 7. Here is another data point in favor of the hypothesis that currency regimes matter.[40]

The second regime change was the shift from the Snake to the Exchange Rate Mechanism. Tables 5 and 6 show that for each of the four Northern European countries, exchange rate variability vis-a-vis the dollar rose after 1979, relative to variability vis-a-vis the mark. In the cases of the Netherlands and Belgium, the variance of equity price differentials increased more vis-a-vis the United States than vis-a-vis Germany, which tends to support the hypothesis. In the cases of France and Denmark, the results are less supportive.

The third regime change, after 1986, was not a formal one. But it has been widely noted that there were far fewer realignments from 1986 to 1992 than during the first seven years of the ERM's existence. Giavazzi and Spaventa (1990) called this period a "new" EMS. Tables 5 and 6 show that exchange rate variability for the four northern European countries fell further vis-a-vis the mark; variability in three cases also fell vis-a-vis the dollar during this period, but by to a smaller degree. Table 8 reports another measure of the equity market links to the U.S. and Germany: the correlation coefficient (currency-adjusted). If we use the correlation criterion, we see that in each of the four countries, the link with German equity markets increased from the first period to the second, to levels higher than the links with American equity markets, again supporting the hypothesis. If we use the variance criterion of Table 7, the results are more ambiguous. [The variability in the differential vis-a-vis Germany is down in three out of four cases, but only in the case of France is it down by more than the variability vis-a-vis the United States.]

Another experiment is offered by three countries that joined the ERM late: the United Kingdom, Portugal, and Spain. The British case clearly supports the hypothesis: the variance in the equity price differential vis-a-vis Germany fell during the period Oct. 1990- Aug. 1992, relative to the period March 1979-October 1990, and it fell by more than the variance vis-a-vis the United States. The correlation criterion shows the same thing: British stocks became more highly correlated with German stocks (and less correlated with U.S. stocks). Portugal shows the same strengthened link with the German equity market.[41] The case of Spain is ambiguous in that the two variances are both down about the same. The correlation criterion is more supportive: the correlation with German equity prices more than doubled after Spain joined the ERM in June 1989.

Other comparisons are possible, and not all support the hypothesis. In particular, the post-1992 period of increased exchange rate variability features a mixed pattern of equity market variances. It bears repeating, moreover, that none of these statistics constitutes a formal hypothesis test. Nevertheless, the weight of this evidence seems to support the proposition that exchange rate

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[40] Bartov, Bodnar, and Kaul (1994) find that the switch to variable exchange rates after the breakdown of the Bretton Woods system raised the monthly variability of equity returns on U.S. multinational companies.

[41] In the case of Portugal, there are only five months between the date it joined the ERM and the September 1992 crisis. During this short period, changes in the escudo/mark rate actually became more variable, though the *level* of the escudo/mark rate became less variable, as expected. We should probably ignore the Portuguese case, due to the small sample size.

variability has real implications for equity markets, even when the changes in exchange rate variability are the exogenous result of regime shifts.

9. Summary of findings regarding the integration of equity markets

We have seen that the existence of fluctuating currencies need not be as large an obstacle to integration of equity markets within a region as might at first appear. Investors can hedge exchange risk on the forward exchange market, at a relatively small cost.

Nevertheless the extreme neutrality view held by some finance theorists, that the exchange rate regime is irrelevant to equity markets, does not accord with the facts. Evidence of currency myopia or related institutional rigidities was offered in Section 4, in the form of such examples as the home-country bias puzzle in portfolio holdings, the reaction to FASB 8 by U.S. corporations in 1976, and the effect of exchange rate changes on country-fund discounts and premiums. Section 5 documented that return differentials between countries' equity markets appear to be correlated with bilateral exchange rate variability. This result could easily be attributable to the fact that foreign exchange prices are endogenous as much as equity prices, that is, that both markets are impacted by third factors. for this reason, it is important that a statistical test try to isolate an exogenous component of exchange rate variability. Sections 6-8 did so by examining statistically the patterns of international equity market correlations under different exchange rate regimes. When Ireland switched from a pound peg to the ERM, the increase in punt/pound variability and decrease in punt/DM variability were exogenous. Yet Irish stock market prices became more closely linked with German equity prices.   In short, currency regimes do matter.

What does all this mean for the European Union? If the goal is to integrate European equity markets, stabilizing bilateral exchange rates would help, and going to a common currency would help still more. It is very difficult to quantify the likely effects of currency union on equity markets. Steil (1993) says, "A single European currency is essential for a truly unified market," while admitting that the political support for European Economic and Monetary Union may not be strong enough to bring it off in the near future. The obstacles to EMU are great, as the principle of the Impossible Trinity and the experience of the 1992 crisis show. The pros and cons involved go far into weighty issues of macroeconomics, politics, and history. Few would claim that the desirability of integrating equity markets in itself constitutes a good reason for undertaking a monetary union that would not otherwise be attempted.

Clearly, further integration of equity markets is possible even under current conditions. It would help if forward and futures markets were more highly developed, e.g., going out to longer horizons, and dealing more often in direct European cross-rates, rather than using the dollar as a vehicle currency. It would also help to eliminate needless restrictions in some countries that prohibit some institutional investors such as life insurance companies from holding foreign-currency assets despite the gains that diversification would bring to their portfolios.

10. Is Europe ready for monetary union?

The plans for eventual European Monetary Union agreed upon at Maastricht in 1991, ran into serious difficulty in the crises of 1992 and 1993. Since then, the membership of the European Community has expanded into an even larger European Union, with the accession of Austria, Finland, and Sweden. Is this too large or diverse a collection of countries to constitute an optimum

currency area?

The theory of optimum currency areas indicates a number of economic criteria, generally falling under the rubric of the degree of economic integration. Regional units are more likely to benefit, on net, from joining together to form a monetary union if: (1) they trade a lot with each other, (2) there is high degree of labor mobility among them, (3) the economic shocks they face are highly correlated, or (4) there exists a federal fiscal system to transfer funds to regions that suffer adverse shocks.[42]

Each of these economic criteria can be quantified, but it is very difficult to know what is the critical level of integration at which the advantages of belonging to a currency area outweigh the disadvantages. The states of the United States constitute a possible standard of comparison. It seems quite clear that the degree of openness of the states, and the degree of economic integration among them, are sufficiently high to justify their use of a common currency. How do the members of the European Union compare to the states in this regard? US states are more open than European countries, by both the trade and labor mobility criteria. It appears that when an adverse shock hits a region of the US such as New England or the oil states of the South, outmigration of workers is the most important mechanism whereby unemployment rates and wages are eventually re-equilibrated across regions.[43] Labor mobility among European countries is much lower than in the U.S..

The other two criteria are also better satisfied within the United States than within Europe. Disturbances across U.S. regions have a relatively high correlation, compared to members of the European Union.[44] When disparities in income do arise in the United States, federal fiscal policy helps to narrow them. Estimates suggest that when a region's per capita income falls by one dollar, the final reduction in its disposable income is only 60 cents. The difference consists of an automatic decrease in federal tax receipts of 34 cents plus an automatic increase in unemployment compensation and other transfers of 6 cents. Neither the fiscal transfer mechanisms that are already in place within the European Union nor those that are contemplated under EMU (so-called "cohesion funds") are as large as those in the U.S. federal fiscal system.[45]

By these optimum currency area criteria, the European Union is not as good a candidate for a monetary union as is the United States. This helps account for the troubles that the Maastricht plan has encountered.

All is not lost however. In the first place, some northern European countries probably do meet the criteria. These are economies that are relatively small and open, and that are linked to the

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[42] A fifth criterion is more political than economic: that there be enough political congruence across the area that residents of different countries put similar weights on reducing inflation versus unemployment, or are willing to sacrifice their optimum macroeconomic choice for the sake of area-wide solidarity.

[43] Blanchard and Katz (1992).

[44] Bayoumi and Eichengreen (1993). An analysis of which countries would stand to gain or lose the most from subordinating their economies to a single European monetary policy, in light of such correlations, is offered by Alesina and Grilli (1992).

[45] Sala-i-Martin and Sachs (1992).

German economy sufficiently closely, that they are willing in essence to subordinate their monetary policies to the Bundesbank: the Netherlands, Luxembourg, Austria, and probably Belgium and Denmark.

Under the terms of Maastricht, the countries that will be admitted to EMU by the end of the decade will be only those that meet four tests. The candidate's currency must have succeeded in remaining within the EMS band for two years; its inflation rate must be close to that of the three best-performing EU countries; the same must hold for its interest rates; and its budget deficit and debt should not exceed specified fractions of GDP. The signers of the agreement hoped in this way to assure convergence of macroeconomic policies. While the four Maastricht tests do not coincide completely with the optimum currency area criteria, European leaders are likely to judge most of the northern European countries named above as meriting admission.

The second point is that European countries are gradually becoming more highly integrated with each other economically, and more willing to think of themselves as Europeans, so that they are a bit more likely to meet the Optimum Currency Area criteria with each decade that passes. A case in point is France. The predecessor to the EMS in the 1970s was the "Snake." Each time the French franc bumped up sharply against the limit in the Snake band, the French government would drop out of the agreement, rather than alter its policies. The EMS, founded in 1979, constituted a more serious attempt at stabilization of European exchange rates and was more successful in the 1980s than the Snake had been. Its first important test arose when Francois Mitterrand first came to power in France in 1981, and tried to expand the French economy at a time when other European countries were not expanding theirs. The consequent balance of payments deficit and downward pressure on the French franc forced Mitterrand to choose between abandoning the expansionary policies and abandoning the exchange rate constraint. Partly for the sake of the EMS and the cause of European integration, he chose the former. Thereafter the French monetary authorities were determined to maintain sufficiently anti-inflationary policies to keep the franc as strong in value as the mark.[46] The speculative attack against the French franc that succeeded in August 1993, requiring a subsequent widening of the band to $\pm$ 15 per cent, cannot readily be attributed to any effort of the French to exercise monetary independence.

European integration continues to increase, partly as a result of such measures as the removal of barriers to trade and labor mobility in 1992. Even if France, Italy, and other EU members do not satisfy the criteria for joining the optimum currency area in the 1990s, perhaps they will subsequently.

What are the implications of different EMU scenarios for financial centers? By now it is clear to almost all that EMU will not happen in 1997, and that if it is to happen in the foreseeable future, it will have to be on a two-speed basis. If EMU were to go ahead in 1999 without France, Frankfurt would be enhanced as a financial center by the enlarged hinterland of the Benelux countries and Austria. Partly for this reason, but much more for well-known political and historical reasons, EMU will not be allowed to go ahead without France. If a French-German monetary union goes ahead prematurely, or if a new shock hits during a delicate transition, we could see a replay of the currency instability of 1992-93. In that case, both monetary union and the integration of equity markets would be set back another five or ten years. London would continue to build its

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[46] Sachs and Wyplosz (1986).

supremacy.   If, on the other hand, such a monetary union succeeds, then the present balance among London, Frankfurt and Paris (followed at a distance by Zurich, Amsterdam, Milan and other financial centers) would probably continue for the foreseeable future.

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