The Structure of Profitability Around the World *

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Abstract: Analysis of data from advanced economies and theories from industrial economics have predisposed many strategists towards a belief that patterns of profitability are structurally similar around the world. We question the universality of such patterns. With time-series data on publicly traded firms in 43 nations, we compare profitability patterns across countries in two ways. First, we show that the correlation in industry-average profitability across the typical pair of countries is close to zero. Correlations are more strongly positive, however, for pairs of countries with common tastes, technology, and national institutions and for pairs that are relatively developed. Second, we find marked departures from the order of "effects" observed in several decompositions of the variance of profitability of U.S. firms. While the U.S. pattern, "firm effects ≥ industry effects ≥ year effects," is the one seen most commonly in our sample of countries, other patterns abound. Further, there is no discernible relationship between similarity in variance decomposition and similarity in tastes, technology, and national institutions. Overall, it appears that "facts" about profitability do not travel well from one country to another. National differences in tastes, technology, and institutions deeply affect patterns of profitability. A corollary is that data from advanced economies alone might not reveal the true roots of differences in firm profitability around the world.

1. Introduction

A core goal of strategy scholarship is to unearth the roots of differences in firm profitability (Rumelt, Schendel, and Teece 1994). Strategy researchers have made great strides in understanding how differences in competitive forces lead to variation in industry-average profitability (Porter 1980) and how differences in firm activities and associated resources generate intra-industry variation in financial performance (Barney 1986, Dierickx and Cool 1989, Porter 1985, Wernerfelt 1984). As a result, we can explain fairly well (at least *ex post*) why, say, the U.S. microprocessor industry produces more profits than the U.S. airline industry or why, within the microprocessor industry, Intel earns a higher rate of return than AMD. Yet if we truly want to understand the full variety of profit rates around the world, it seems that we must go beyond an understanding of inter-industry and intra-industry differences. We must also understand how differences in national characteristics contribute to differences in profitability. We must examine, for instance, whether the airline industry produces meager profits everywhere and if not, why not.

On the question of how much national characteristics affect patterns of profitability, an implicit divide exists in the strategy field. Much research proceeds under an unstated assumption of "global determinism": tastes and technology are similar enough around the globe and constrain profitability sufficiently that patterns of profitability should be similar worldwide. In line with this perspective, empirical research in the strategy field focuses almost exclusively on a handful of advanced economies. The implicit message is that the patterns discovered there are representative of the world as a whole. Yet contrary to this message, important contributions discussed below suggest an alternative perspective, "local contingency": tastes and technologies are so different from one country to another and their impact on profitability depends so heavily on local institutions that profitability patterns might vary substantially.[1]

In this paper, we pit the global determinism and local contingency perspectives against one another empirically, in two ways. First, we consider how similar industry profit rates are

[1] Krugman (1991) notes a similar divide in economics: "In spite of a growing interest in "path dependence," most economic analysis remains dominated by a style of model that I like to think of as TTFE: the idea that the economy's behavior is basically determined by its (exogenously given) tastes, technology, and factor endowments. In opposition to TTFE is…the idea that important aspects of the economy are contingent, determined by history and accident" (p. 100).

across countries. On the question of industry profitability, strategy research—particularly lines of work influenced by industrial economics—has an especially strong flavor of global determinism. Primitives related to tastes and technology dictate the structure of each industry (e.g., entry barriers, minimum efficient scale, concentration levels). They also influence the conduct of competition within the industry and the potential to avoid rent-eroding rivalry. Together, structure and conduct determine the profitability of the industry (Bain 1956). This process plays itself out in similar fashion around the world; it matters little whether the industry in question is in the United States, Japan, or Brazil. Tastes and technology strongly constrain equilibrium industry structure and conduct and thus industry profitability (Caves 1989, Connor *et al.* 1985, Scherer 1980). To the extent that tastes and technology are similar across countries, this perspective predicts that a given industry will be similarly profitable in different countries. Supporting this point of view, empirical research shows that concentration levels—often taken as summary statistics for industry structure—are highly positively correlated across small samples of advanced economies (Bain 1966; Connor *et al.* 1985, George and Ward 1975, Phlips 1971, Pryor 1972).

Contrary to this perspective, a proponent of local contingency would argue that a given industry need not earn similar profit rates in different countries. Tastes and technology may differ substantially from one nation to another. Moreover, as we discuss below, the national institutions that mediate between tastes and technology on one hand and structure and conduct on the other may also differ in important ways across countries. Burgeoning work in strategy, industrial economics, sociology, and finance recognizes the importance of institutions and institutional differences (Aoki 1990, Austin 1990, Granovetter 1994, North 1990, Porter 1990, Williamson 1985).

In this paper, we use a data set spanning 43 countries to examine whether industry profit rates are similar across countries. In essence we ask, "Are the same industries highly profitable or unprofitable in, say, Thailand and Finland?" The answer, we find, is an extremely weak "yes." As a proponent of local contingency would expect, the "yes" is discernibly stronger for pairs of countries that are similar with respect to tastes, technologies, and institutions and for pairs that are relatively advanced.

Our second line of attack concerns not the level of profitability but the structure of variance in profitability. A long tradition of research in strategy (Brush *et al.* 1999, McGahan and Porter 1997, 1999, Roquebert *et al.* 1996, Rumelt 1991, Schmalensee 1985, Wernerfelt and Montgomery 1988) attempts to partition the variance in firm profitability into various "effects"—industry effects that reflect conditions of entry and extended rivalry, firm effects that embody the product- or factor-market positions of individual business units, year effects that capture macroeconomic conditions, and corporate effects that reflect corporate parentage. Though these studies differ in the methodologies they use, the data they employ, and the precise conclusions they reach (see McGahan and Porter (1999) for a survey), the body of research has begun to coalesce around a set of fairly robust findings. The largest role in accounting for differences in profitability is generally ascribed to firm, or business-specific, effects while the smallest—near negligible—role is given to year effects. Industry effects are acknowledged to be important, though not as large as firm effects. Corporate effects have been the object of the hottest debate (Bowman and Helfat 2001, Brush *et al.* 1999), but are now generally thought to be comparable in significance to or somewhat smaller than industry influences. These findings have begun to take on the status of "fact" in the strategy field.

Virtually all prior variance decomposition studies use U.S. data alone. We examine whether the "facts" these studies produce hold true around the world as a global determinist would expect. To the contrary, we find statistically significant and economically meaningful distinctions across countries. The rank order of effects (firm ≥ industry ≥ year) found in studies based on U.S. data appears frequently in other countries in our data set, but is by no means the only pattern we see. We also investigate whether pairs of countries with similar tastes, technologies, and institutions display similar variance components. We find no such pattern, in contrast to our results for industry-average profitability.

Overall, our findings support the local contingency perspective. "Facts" about profitability do not travel well. If a scholar or manager has information about which industries have high levels of profitability in one country, it is unwise to carry that information elsewhere unless the destination is very similar to the origin. Information concerning profitability variance is even more fragile than information concerning profitability levels. Though it is often true that firm effects are larger than industry effects and industry effects larger than year effects, even this weak generalization does not hold true everywhere. Moreover, our proxies for national characteristics give us little ability to predict which countries will have similar variance components.

The paper is organized in the conventional manner: after considering antecedents and developing hypotheses, we describe the data set and methodologies, share results, and discuss implications.

2. Literature Review and Hypotheses

2.1 Single-country Research on Profitability Differences

From the pioneering work of Joe Bain (1951) until the early 1980s, empirical work on differences in profitability was dominated by a search for causal relationships among industry structure, conduct, and performance (often referred to as the structure-conduct-performance paradigm – SCPP). The prototypical study in this line looked across many industries and sought to explain profitability—usually indicated by industry price-cost margin—by reference to "structural" variables such as concentration, advertising intensity, or R&D intensity. Structural conditions, the SCPP argued, reflected deeper, primitive characteristics of tastes and technology. An industry whose production technology exhibited strong economies of scale, for instance, would tend toward high concentration. An industry in which customer tastes were highly heterogeneous might be more fragmented, *ceteris paribus*.

Though SCPP research yielded many insights and uncovered a host of empirical patterns, critics pointed out that the profit and structure metrics were flawed and that most elements of structure were endogenous (Schmalensee 1989). Moreover, results were often difficult to interpret; it was unclear, for example, whether the commonly observed positive relationship between concentration and profitability reflected the market power or the efficiency of large firms (Demsetz 1973). Faced with these critiques in the mid-1980s, researchers interested in profitability differences broadly adopted one of two very different directions in their quest for empirical regularities. The first was to look at in-depth industry studies using new econometric techniques, and the second was to examine the statistical nature of variance in profitability.

Econometric analyses of single industries, often referred to as the New Empirical Industrial Organization (NEIO), took "the best from two great empirical IO traditions: SCPP and industry case studies" that pre-dated Bain's work (Bresnahan 1989: p. 1013). In contrast to cross-industry SCPP research, each NEIO study focused on a single industry and exploited differences over time and across firms to pinpoint the causes of variation in performance. NEIO studies were especially successful in detecting market power directly from firm conduct, rather than inferring power indirectly from firms' price-cost margins.

Faced with the limitations of SCPP studies, a handful of other researchers abandoned the search for causal relationships and redirected attention to more descriptive studies. Starting with the work of Schmalensee (1985) and Rumelt (1991), these researchers sought to document not the structure of industries, but *the statistical structure of the variance in profitability*. A typical study in this line started by assuming that r_{jt}—the profitability in period t of firm j, which operates in industry i—follows the following process:

$$r_{jt} = \mu + \gamma_t + \alpha_i + \delta_j + \varepsilon_{jt}. \qquad (1)$$

μ captures the long-run mean profitability of all firms in the economy, presumably incorporating the average cost of capital. γ_t is a year effect, reflecting all macroeconomic phenomena that affect all observations of profitability in period t. α_i, the industry effect that applies to all members of industry i, is typically interpreted as an indication of entry conditions, the intensity of rivalry, the bargaining power of customers and suppliers, and the threat of substitutes in the industry (Porter 1980). α_i would also capture any accounting idiosyncrasies that persistently boost or depress observed profitability in industry i. δ_j, a fixed effect for firm j, incorporates the lasting influence on profitability of any activities or resources that distinguishes the firm from its industry peers. The final term, ε_{jt}, is a transient shock to firm j's profitability in period t. (Some studies included an additional term that reflects corporate parent effects. We discuss our omission of this term below.)

Equation 1 implies that any variance we observe in profitability r_{jt} comes from underlying variation in year, industry, firm, and transient effects as well as co-variation among these effects. Studies that began with Equation 1 assumed that year effects, for instance, are drawn from some distribution with variance σ_γ^2. Likewise, industry, firm, and transient effects are drawn from distributions with σ_α^2, σ_δ^2, and σ_ε^2, respectively. The studies aimed not to isolate effects such γ_t, α_i, and δ_j, but rather to estimate the variance components σ_γ^2, σ_α^2, σ_δ^2, and σ_ε^2 (and possibly covariance terms such as $\sigma_{\gamma\alpha}$). The size of, say, σ_α^2 relative to the other variance components was taken as an indication of how important industry effects are in accounting for variation in profitability. A long series of variance decomposition studies (Brush *et al.* 1999, McGahan and

Porter 1997, 1999, Roquebert *et al.* 1996, Rumelt 1991, Schmalensee 1985, Wernerfelt and Montgomery 1988) produced the consensus described above—that $\sigma_\delta^2 \geq \sigma_\alpha^2 \geq \sigma_\gamma^2 \approx 0$.

2.2 Multi-country Research on Profitability Differences

By and large, the SCPP, the NEIO, and the variance decomposition literature focused on understanding data from the U.S. and a handful of similar advanced economies. As noted in the introduction, the SCPP in particular was marked by a sense of "global determinism." Tastes and technology were implicitly assumed to be homogenous and constraining enough to make patterns in profitability quite similar around the world. Even in the handful of SCPP-style studies performed outside advanced economies, a sense of global determinism prevailed. For instance, in their study of manufacturing industries in Chile, Colombia, Morocco, and Turkey, Roberts and Tybout (1996) noted that the cross-country rank correlations of employment turnover and of plant entry and exit by industry were very positive. Their interpretation was that technological characteristics constrained industries to be structured quite similarly in these countries. Likewise, U.S.-based variance decomposition studies spoke in general terms about the relative size of firm, industry, and year effects, without the caveat that documented patterns might not apply outside the U.S.

Yet all three traditions offered indications that profitability variation might have very different roots in different locales—that local contingency might be more appropriate than global determinism. We mention only a sample of the indications here. The work of Caves *et al.* (1992), derived from the SCPP literature, compared the determinants of industrial efficiency in the U.S., Japan, Korea, Britain, Canada, and Australia. The authors used inter-industry differences within each country to examine the effects on efficiency of competition, organization, sources of heterogeneity such as product differentiation and geographic dispersion, dynamic disturbances such as rapid growth, and public policies. They then asked whether the effects were similar across the six nations. Below the highest level of generalization (e.g., intense competition enhances efficiency within an industry), the determinants of efficiency differed substantially from one country to another. (Caves (1989) provides a broader, excellent survey of international comparative research in the SCPP tradition. His section 6, on the determinants of profitability, cites evidence for and against global determinism.)

Sutton (1991) exploited cross-country differences in the context of in-depth industry studies. His point of departure was that the plethora of game-theoretic models developed in the 1980s had yielded little empirical fruit since their predictions were sensitive to small perturbations in underlying assumptions. His alternative approach was to derive game-theoretic predictions that were robust to wide classes of model assumptions and were not specific to particular industries. Sutton then searched in carefully selected industries in six advanced economies for confirmation or refutation of the robust predictions. Cross-country comparisons bore out the central prediction of his theory – that there existed a lower bound on concentration levels as market size increases in industries with endogenous sunk costs but not in industries with exogenous sunk costs. The multiple countries in Sutton's industry studies provided a crucial source of variation: they produced differences in market size. His results suggested, among other things, that industry structure may differ in important ways across countries; technology and tastes may place *bounds* on the structure of many industries, but not determine it fully.

Drawing on both the SCPP tradition and in-depth studies of industries and countries, Porter (1990) argued that local conditions have a profound influence on the competitiveness of firms. In particular, he emphasized the pervasive roles played by input- and product-market conditions, firm strategy and rivalry, and related and supporting industries. All of these factors, he argued, are strongly affected by government action and by chance and, accordingly, may differ dramatically from one country to the next. An implication, not examined explicitly, is that patterns of profitability may also differ radically.

Almost all variance decomposition studies have focused on the U.S. alone, using Line of Business data gathered by the Federal Trade Commission in the mid-1970s (Rumelt 1991, Schmalensee 1985) or business segment data on publicly traded firms collected by Compustat (Brush *et al.* 1999, McGahan and Porter 1997, 1999, Roquebert *et al.* 1996). Three studies, however, looked beyond the borders of the U.S. Furman (2000) found that the importance of year, industry, corporate, and firm effects was similar in Australia, Canada, the United Kingdom, and the U.S. Note that these four countries are reasonably similar in their national characteristics. Though their focus was not variance decomposition per se, Khanna and Rivkin (2000) showed that the relative importance of year, industry, business group, and firm effects varied widely across 14 emerging economies.[2] The size of business group effects was not systematically related to a number of institutional proxies they explored. Chang and Hong (1998), in a single-country study, found that a substantial fraction of the variance in profit rates of Korean firms was attributable to business group (*chaebol*) effects. They interpreted their results as evidence that the small corporate effect sometimes discovered in U.S. data was not necessarily representative of patterns outside the U.S.

Studies such as these suggest that patterns of profitability variance may be substantially different in different countries. This may be so because tastes differ in important ways from one nation to another. By "tastes," we mean the set of inputs into individual utility functions as well as the distribution of preferences across a country's population. Technology may also differ substantially across countries. "Technology" incorporates the full range of productive assets available to firms in an economy. If the taste category characterizes the demand side of markets, technology deals with the supply side. Moreover, countries may have very different economic institutions. Following North (1990), we use the term "institutions" to encompass all the "rules of the game" that affect interactions among economic actors. Included in this category are diverse concerns such as property right protections, mechanisms for contract enforcement, standards and channels for information disclosure, levels of development of capital and labor markets, the stability of governments, respect for the rule of law, and so forth. Institutions mediate between tastes and technology on one hand and industry structure and firm performance on the other. Together, tastes, technology, and institutions are the national characteristics we consider that influence patterns in profitability differences.

In our effort to detect the fingerprints of national characteristics on patterns in profitability differences, we adapt notation from the variance decomposition studies. A simple elaboration of Equation 1 allows means, year effects, and industry effects to vary from one country k to another:

$$r_{jt} = \mu_k + \gamma_{tk} + \alpha_{ik} + \delta_j + \varepsilon_{jt} \qquad (2)$$

[2] A business group is typically a family-controlled network of firms spread over diverse industries. Each firm in the group is a separate legal entity, and some of the firms are typically publicly traded. The business group is the closest analog to the corporate entity which features in most U.S. variance decomposition studies.

where firm j operates in country k. Accordingly, variance components may also differ across countries: $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$. Based on this equation, we develop and test two sets of hypotheses.

2.3 Hypotheses Concerning Industry Profitability

Our first set of hypotheses concern the α_{ik}'s in Equation 2. Tastes, technologies, and institutions in each country influence competitive forces (Porter 1980) in each industry and thereby affect which industries are relatively profitable or unprofitable there. Regulatory barriers, for instance, may help to keep profitability high in German retail industries. The availability of hydroelectric substitutes may contribute to low petrochemical profits in Brazil. To the extent that there is little variation in tastes, technologies or institutions across countries, comparable α_{ik}'s may arise in different countries. If this is so, as a global determinist would predict, we will observe the following pattern in industry-average profitability across countries:

Hypothesis 1 The same industries are highly profitable or unprofitable in different countries.

A weaker speculation, consistent with local contingency, is as follows.

Hypothesis 2: For pairs of countries with similar national characteristics, the same industries are highly profitable or unprofitable.

Note that Hypothesis 2 does not speculate on the precise relationship between particular national characteristics and the set of α_{ik}'s that arises in a country. Rather, it says simply that some, unexplored, possibly complicated relationship exists between characteristics and the set of α_{ik}'s. Pairs of countries with like characteristics will exhibit similar sets of α_{ik}'s.

Our third hypothesis is that patterns in industry-average profitability in any two countries become more alike as the countries develop. Put differently, institutional development brings with it a process of convergence in industry-average profitability. Three steps of reasoning lead to this hypothesis. First, economic development consists of a process of competition among institutions. Second, at any point in time, equifinality holds, that is, a variety of different institutional configurations may yield a given performance level. Third, as the level of development increases, industries increasingly approach the globally optimal efficiency levels of which each is capable, thus increasingly erasing differences in their equilibrium profitability (even though equifinality may well continue to dictate that different institutional configurations are consistent with reaching this globally optimal efficiency level).

The first link in this chain of reasoning dates back to Schumpeter (1911) – that development consists of an economic system choosing the most efficient way to allocate resources, from among alternative and competing institutional configurations within the system. This idea has been embraced by much recent influential work. North's Nobel Memorial address describes development largely in terms of the process through which institutions interact over time, recognizing, of course, that the vast majority of such interactions result in economies getting "stuck" in undeveloped equilibria (North 1994: page 364). Porter (1990) describes a relentless process of competition among a variety of economic actors through which economic development occurs. An application of such ideas to the financial system describes an "innovation spiral, in which organized markets and intermediaries compete with each other in a *static* sense and complement each other in a *dynamic* sense" (Merton and Bodie 1995: p. 4; italics in original).

The second step states that a particular level of system efficiency can be delivered by a variety of institutional configurations (Kogut, 2000). Thus, Merton and Bodie (1995) suggest that it is fruitful to think of the evolution of financial systems as involving relatively constant functions that must be performed (such as pooling of resources, managing risk, clearing and settling payments, etc.), though a variety of institutional configurations might perform such functions. Consistent with this perspective, Aoki's (1990) work on the Japanese firm demonstrates how Japanese and Western institutional arrangements, though radically different, perform very similar corporate governance functions.

Finally, as development occurs and regardless of the particular institutional configuration that delivers the development, each industry will increasingly adopt a configuration, one of possibly many, that delivers the globally optimal efficient performance outcome for that industry. The competitive process will, with increasing ease, be able to weed out parts that are least aligned with the set of possible optimal configurations. We can thus hypothesize the following.

Hypothesis 3: There is increasing similarity in the profitability of industries in a pair of countries as the average level of development of the pair of countries increases.

2.4 Hypotheses Concerning Variance Components

Country characteristics may affect not only the particular α_{ik}'s that are realized in each country, but also the variance components that underlie the year, industry, firm, and transient effects in Equation 2. What characteristics of country k affects the size of $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$? A country with large macroeconomic shocks and firms whose profit rates are exposed to those shocks would exhibit a relatively high $\sigma_{\gamma k}^2$. Where industries differ markedly from one another in terms of the levels of long-term profitability they permit, presumably due to stark inter-industry differences in entry barriers and extended rivalry, we expect a relatively large $\sigma_{\alpha k}^2$. High $\sigma_{\delta k}^2$ implies the persistence of large intra-industry differences in profitability. We expect such differences to arise where regulatory and competitive conditions allow wide variation in ways of competing and selection pressures are weak enough that variation endures. Finally, high $\sigma_{\varepsilon k}^2$ characterizes a locale in which the intra-industry positions of particular firms improve or degrade rapidly and for short periods.

In sum, $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$ reflect the underlying tastes, technologies, and institutions of country k in complicated ways. For instance, a nation such as India displays a great diversity of tastes due to geographic, linguistic, racial, ethnic and religious heterogeneity. In such a setting, we might expect firms within an industry to pursue diverse strategies and earn quite different rates of return. Accordingly, $\sigma_{\delta k}^2$ might be relatively high. Technology also influences variance components. In a developing economy with little access to scale-sensitive technologies, for example, concentration levels and hence profit rates may be uniformly low across most industries. In such a country, we would expect to observe a low $\sigma_{\alpha k}^2$. That is, industries would differ little from one another in terms of long-run profitability. Institutions also play an important role. In a country where governments and their policies shift rapidly, for instance, macroeconomic shocks might be common and dramatic, boosting $\sigma_{\gamma k}^2$. In a nation where product markets are fiercely competitive and capital markets unforgiving, poor performers in an industry may be weeded out rapidly, depressing $\sigma_{\delta k}^2$.

To the extent that there is little variation in tastes, technologies, and institutions across countries, a global determinist would hypothesize:

Hypothesis 4: Variance components are similar across countries.

Note that the strategy field's growing acceptance of "facts" about profitability based almost exclusively on U.S. data is an implicit endorsement of Hypothesis 4. A weaker, contingent version of Hypothesis 4 is:

Hypothesis 5: Countries with similar national characteristics have similar variance components.

Finally, the analog to Hypothesis 3 on convergence is:

Hypothesis 6: There is increasing similarity in the variance components in a pair of countries as the average level of development of the pair of countries increases.

We emphasize that Hypotheses 4 and 5 are quite distinct from Hypotheses 1 and 2, despite their surface similarity. Either pair could be true while the other is false; acceptance of one does not imply the other. The made-up example in Figure 1 illustrates this point. In Panel A, industry-average profitability is identical in each industry in Countries A and B. This supports both Hypothesis 4, since $\sigma_{\alpha A}^2 = \sigma_{\alpha B}^2$, and Hypothesis 1, since $Cor(\alpha_{iA}, \alpha_{iB}) = 1$. In Panel B, industry averages are "stretched apart" in Country B. $Cor(\alpha_{iA}, \alpha_{iB})$ remains 1 in support of Hypothesis 1, but $\sigma_{\alpha A}^2 < \sigma_{\alpha B}^2$, contrary to Hypothesis 4. In Panel C, industry averages are "switched around" among industries in Country B. $\sigma_{\alpha A}^2 = \sigma_{\alpha B}^2$ as in Panel A, supporting Hypothesis 4, but $Cor(\alpha_{iA}, \alpha_{iB}) << 1$, contrary to Hypothesis 1.

3. Data

To test our hypotheses, we piece together two data sets. The first and most difficult task is to gather data on profitability from the 43 countries listed in Table 1. The second job is to track down proxies for national characteristics of the 43 countries. In this section, we discuss the data sets in detail, describing both their attractive features and their inevitable "warts."

3.1 Raw Profitability Data

For 41 countries (all 43 other than the U.S. and Canada), profitability data come from the Firm Accounts Database of Datastream International, one of the most comprehensive international providers of information on publicly traded firms. Datastream, in turn, gathers information from the data vendor it considers to be the most reliable in each country it covers. Datastream does not claim to cover all of the publicly traded firms in any country, but selects those that it considers the most prominent and important. Of course, this raises the specter of selection bias. We choose to live with this potential bias, for three reasons. First, as far as we can discern from Datastream representatives, the informal process by which firms are selected for coverage focuses not on our dependent variable, profitability, but on other factors such as firm size and stock market activity. Second, we take comfort in the fact that the selection process is presumably the same across the 41 countries in question. Hence, selection need not interfere with testing our hypotheses. Third, accepting the bias is more palatable than the alternative: piecing together the data from local sources. Such sources are more comprehensive (Khanna and Rivkin 2000), but each introduces its own idiosyncratic selection criteria. In addition, such sources do not "translate" financial items as Datastream does. With Datastream, we can be more confident, for instance, that "operating profit" corresponds to the same construct in various countries. In sum, we accept some selection bias in order to gain consistency across countries. The 41 countries are all of the countries in which Datastream provides enough observations to perform the analyses described below.

Datastream records annual information concerning firm financial performance. Following a number of prior studies (Furman 2000, McGahan and Porter 1997, Roquebert *et al.* 1996, Rumelt 1991, Schmalensee 1985), we focus on the ratio of operating profit to total assets (ROA) as an indicator of profitability. We opt to examine operating profit rather than net profit for two reasons. First, operating profit is not (directly) distorted by taxation rules, which differ dramatically across countries. Second, a consistent measure of operating profit is available in more countries than is net profit. Accounting measures of profitability *do* have limitations (Benston 1985), however, and a handful of U.S. decomposition studies opt to use Tobin's q to address the limitations (McGahan and Porter 1999, Wernerfelt and Montgomery 1988). Unfortunately, the data required to calculate Tobin's q are available for far fewer countries and firms than are the data necessary to compute ROA.

Datastream identifies the industry in which each firm competes. Datastream's classification scheme, based on the Financial Times' FTSE categories, includes just over 100 industries. In contrast, the SIC system includes roughly 75 2-digit industries and 450 4-digit industries. Most U.S.-focused variance decomposition studies and many SCPP-style studies use 4-digit SIC codes. Hence our industries are not as fine-grained as those employed in U.S. studies. As discussed below, we expect this to depress the variance of industry effects we observe.

Our U.S. and Canadian data come from Compustat. (We could not obtain U.S. and Canadian data we considered adequate from Datastream.) Compustat identifies the industry in which each firm competes based on 4-digit SIC codes. We assign a Datastream industry code to each U.S. and Canadian firm using codes directly from Datastream when available and using a hand-constructed concordance otherwise. Compustat's coverage tends to be more comprehensive than Datastream's, encompassing a large number of very small firms. To make the U.S. and Canadian samples more comparable to the samples from other countries and the samples used in prior U.S. studies, we follow McGahan and Porter (1997) and remove observations with assets less than US$10 million.

3.2 Scrubbing of the Profitability Data

A complete observation contains the following information: the name of the firm, the country and industry in which it competes, the year in which the observation is taken, and the operating income and year-end total assets of the firm in that year. We start with 218,401 observations, but many have flaws. We eliminate 22,668 observations classified in catch-all "miscellaneous" industries or no industry whatsoever; 37,025 observations in the financial / real estate sector, where profitability is typically calculated in a manner that is inconsistent with returns in other sectors; 52,302 observations that lack profitability information; and 10,967 U.S. and Canadian observations with assets less than US$10 million.

Finally, we remove observations in which firms exhibit precipitous declines in total assets. Histograms of year-over-year asset changes reveal that situations in which assets fall by more than 50% are statistically unusual. Spot-checks of annual reports show that such situations reflect large-scale divestitures, shifts in firms' core businesses, and preparations for exit. Since we wish to focus on the profitability of on-going concerns, we remove 514 such observations from our sample.

3.3 Description of the Profitability Data

We are left with 94,925 clean observations. Table 1 provides descriptive statistics by country. Several patterns in the table are worthy of note. First, the number of observations ranges from merely 61 in Venezuela to 43,989 in the U.S. We are able to compute industry profitability, variance components, and other measures more precisely for countries with many observations. Accordingly, cross-country analyses must be sensitive to the varying degree of precision. We address this issue in the methodology section below. Second, the time series for each country begins in either the late 1980s or early 1990s, and always terminates in the year 1997. The shortest time series for which we have data is six years long. Third, mean ROA varies widely across countries, from 0.1% in Portugal to 22.4% in Turkey.[3]

Finally, the countries have profitability distributions that differ dramatically from one another. Some distributions are narrow (e.g., Portugal, Venezuela, Japan) while others display very high variance (Singapore, the U.S., Peru). The distributions differ not only in their breadths, but also in their shapes. A number are roughly symmetric, with skewness ≈ 0, but others are sharply skewed to the left (e.g., Sweden) or the right (Singapore). Virtually none display the shape of a normal distribution, with skewness = 0 and kurtosis = 3. Almost all are more peaked than normal (kurtosis > 3) with heavy tails. The tails reflect the presence of large negative outliers and a smaller number of positive outliers. The methodology section presents ways of dealing with these outliers. Note for future reference that the countries with the most extreme outliers include some very advanced economies (e.g., Canada, the United Kingdom, the U.S.), but the countries with the narrowest ranges of profitability also include some of the most advanced economies (e.g., Japan, Switzerland, Belgium). Overall, the descriptive statistics suggest that profitability variance differs in important ways across national borders.

[3] Differences in mean country profitability should affect neither the industry-profitability analysis nor the variance decomposition analysis we perform since both styles of analysis focus on differences from country means. See the methodology section below.

3.4 Proxies for National Characteristics

To test hypotheses 2 and 5, we must develop proxies for national tastes, technology, and institutions—or at least indicators of how similar pairs of countries are along these dimensions. For hypotheses 3 and 6, we need proxies for how developed pairs of countries are. Such proxies will inevitably be crude, but we are assisted a great deal in this effort by burgeoning research on economic growth. In recent years, the growth literature has focused on the relationship between growth rates and national characteristics, especially institutional features (e.g., Levine and Zervos 1998, Rajan and Zingales 1998). Many of our proxies come directly from this line of research.

The proxies we employ are detailed in Table 2. We explore a large number of proxies because each individual proxy is rough and encompasses only a subset of all aspects of tastes, technology, and institutions. The large number allows us to look for robust patterns. The first 15 of the 25 proxies attempt to capture similarity in national characteristics. Our maintained assumption is that countries that are at similar levels of per-capita income, have equally educated populations, and are physically close to one another will tend to exhibit similar tastes and have access to similar technology. Along the institutional dimension, we look for similarity in terms of openness to international trade and currency flows, availability of information, government involvement in the economy, presence of corruption and currency distortions, respect for the rule of law, and historical origin of legal or accounting systems.

Many of the similarity proxies are built from familiar and concrete concepts (e.g., GDP per capita, trade share of GDP, miles between capital cities). Some are constructed from subjective assessments made by country analysts (e.g., indices of technological sophistication, respect for the rule of law, currency regimes, and corruption). Others are based on in-depth historical or social analyses performed by others. Huntington (1996), for instance, categorizes countries into one of seven "civilizations." This allows us to construct a dummy variable indicating whether the countries in each dyad are members of the same civilization. If they are, we expect them to display similar tastes and institutions. Similarly, La Porta *et al.* (1998) argue that most legal systems descend from one of four distinct traditions: English, French, German, and Scandinavian. Pairs with similar traditions are likely to share legal institutions. Nair and Frank (1980) classify accounting systems into four different groups, based on a factor analysis of

1973 data collected by Price Waterhouse. This classification allows us to identify dyads that are likely to have common accounting conventions.

The last ten of the 25 proxies are indicators of average development in a dyad. Our presumption is that highly developed dyads will typically consist of countries with high incomes, highly educated populaces, many telephone per capita, good access to technology, strong respect for the rule of law, liberal currency regimes, openness to foreign trade, low black-market currency premiums, and little corruption.

4. Methodologies

Our hypotheses introduce four distinct methodological challenges, which we address in turn.

4.1 Correlations in Industry Profitability

Hypothesis 1 requires us to devise a measure of similarity in industry profitability across countries. To do so, we first compute the profit rate in each industry in each country thus:

$$\pi_{ik} = \Sigma_{t,\, j \in i,k} \text{ Operating Profit}_{jt} \,/\, \Sigma_{t,\, j \in i,k} \text{ Total Assets}_{jt}. \qquad (3)$$

We then calculate $IndCor_{kk'}$, the correlation across industries of π_{ik} and $\pi_{ik'}$ for each pair of countries k and k'. In doing this, we weight each industry by the number of observations in the industry in countries k and k'. This reflects the fact that when we have more observations in an industry, we are more confident that the calculated π_{ik} is an accurate reflection of true long-run industry profitability. To the extent that most of the resulting correlations are significantly positive, we can affirm Hypothesis 1, that the same industries are highly profitable or unprofitable in different countries.

Note that we focus on the magnitude and sign of cross-industry *correlation* in profitability for country pairs k and k', rather than on similarities in the *actual levels* of profitability of industries. This is so for both conceptual and practical reasons. Conceptually, we are more interested in institutional variation that differentially affects the relative attractiveness of industries than we are in institutional variation that affects all industries equally, of the sort that primarily shifts the overall average profitability of industries in one direction.[4] Practically, though we use Datastream-standardized data, some differences in subtle accounting treatments remain across countries that may shift all profit rates in a country up or down together (Nobes and Parker 2000). Relying on correlations of industry profitability rather than on absolute profitability levels minimizes any problems associated with such differences.[5]

4.2 Correlations in Industry Profitability and National Similarity

Hypothesis 2 holds that $IndCor_{kk'}$ will be especially high when countries k and k' have similar tastes, technology, and institutions. Hypothesis 3 posits that $IndCor_{kk'}$ will be higher the greater is the average level of institutional development. We test these hypotheses with both bivariate and multivariate techniques. First, we examine the bivariate correlation of $IndCor_{kk'}$ with each of the similarity and development proxies shown in Table 2 and discussed above. Second, we perform the following multivariate regression on country dyads:

$$IndCor_{kk'} = \chi + \boldsymbol{\lambda}'\mathbf{NatSim_{kk'}} + \boldsymbol{\kappa}'\mathbf{AvgDev_{kk'}} + \xi_{kk'}. \qquad (4)$$

Here $IndCor_{kk'}$ is the cross-industry correlation of profitability in countries k and k'; $\mathbf{NatSim_{kk'}}$ is a vector whose elements are the 15 indicators of national similarity shown in Table 2, for countries k and k'; $\mathbf{AvgDev_{kk'}}$ is a vector whose elements are the ten proxies for the average level of development in countries k and k' as in Table 2; χ, $\boldsymbol{\lambda}$ and $\boldsymbol{\kappa}$ are coefficients to be estimated; and $\xi_{kk'}$ is a residual error. The regression in Equation 4 is performed on the 43 x 42 / 2 = 903 country pairs.

For those variables for which we have an ordinal ranking, the appropriate entry of $\mathbf{NatSim_{kk'}}$ is measured as the proportional difference between the values of the pair of countries in the dyad in question. For those for which we have only a categorization (such as legal origin

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[4] An example concerns the size of each country, whose effect we do not model explicitly. A standard treatment would suggest that greater size, in any environment with fixed cost characteristics, attracts more players and exacerbates price competition. This is an example of an effect that reduces the profitability of all industries in a country, rather than affecting only a subset of industries within each country.

[5] Our industry-profitability correlation measure is based only on the industries common to both countries in a dyad. If the companies in Country A operate in altogether different industries than the companies in Country B, then we will be unable to measure any industry-profitability correlation for A and B. The fact that the countries participate in entirely different industries is an indication that the economies are very different—an indication that our research will miss. This omission will be particularly acute if the composition of industries varies as a function of institutional characteristics. An argument dating back to Rosenstein-Rodan (1943), and recently formalized by Murphy et al. (1989), argues just this. Thus our measure may understate the degree to which economies are structurally different.

or type of accounting regime), $\mathbf{NatSim_{kk'}}$ is measured as a "1" if the countries in the dyad are in same category or as a "0" otherwise. $\mathbf{AvgDev_{kk'}}$ is always proxied for by the average value of a range of variables that are plausibly correlated with institutional development.

The bivariate correlation and multivariate regression raise three issues. First, because the unit of analysis is the dyad, it is implausible to assume, as one normally does in correlation or regression, that residual errors $\xi_{kk'}$ are independent of one another. Random factors that boost the likelihood that, say, countries A and B have high correlation and countries B and C have high correlation also increase the odds that countries A and C have high correlation; ξ_{AB}, ξ_{BC}, and ξ_{AC} depend on one another in a manner that is potentially complex. When $\xi_{kk'}$'s are not independent, the usual significance tests associated with regression become invalid. To deal with this issue, we employ the non-parametric quadratic assignment procedure (QAP) to assess significance. This technique is commonly used by researchers who examine dyads in social network data (Baker and Hubert 1981, Krackhardt 1988, Gulati and Gargiulo 1999).[6] Second, the dependent variable is bounded below by –1 and above by +1, making censored regression necessary instead of ordinary least squares. A third issue arises because the left-hand-side variable in Equation 4 is derived from estimates. That is, it is measured with error. Hence we weight each dyad kk' to reflect the relative confidence we have in $IndCor_{kk'}$. The weights are based on the number of profitability observations that go into calculating $IndCor_{kk'}$. (All results shown below are qualitatively similar if one does not use weights.)

A fourth and final issue arises in the multivariate regression: the elements of $\mathbf{NatSim_{kk'}}$ are highly correlated with one another. So are the elements of $\mathbf{AvgDev_{kk'}}$. If one were to put all the elements of $\mathbf{NatSim_{kk'}}$ and $\mathbf{AvgDev_{kk'}}$ into a regression, the multicollinearity would result in estimates with very large standard errors. To avoid this, we first perform a factor analysis on $\mathbf{NatSim_{kk'}}$, in order to identify a smaller number of underlying factors embedded in the

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[6] First we estimate the censored regression model in Equation 4 to obtain a point estimate of $\boldsymbol{\lambda}$, **l*** and of $\boldsymbol{\kappa}$, **k***. Then we permute the rows and columns of **INDCOR** (the matrix whose entries are $\mathbf{IndCor_{kk'}}$) at random – that is, the rows of **INDCOR** are rearranged in a new, randomly assigned order, and the columns are rearranged in the same order – and estimate Equation 4 again. Under the null hypothesis that $\mathbf{NatSim_{kk'}}$ and $\mathbf{AvgDev_{kk'}}$ have no influence on $\mathbf{IndCor_{kk'}}$, this produces a second estimate of $\boldsymbol{\lambda}$ and $\boldsymbol{\kappa}$ that preserves the pattern of interdependence in the error terms. We repeat this procedure of random permutation and probit estimation 500 times, thereby generating a distribution for **l*** and **k*** that is valid under the null. Finally, we compare each element of the vector **l*** and **k*** to the distribution generated for that element. If the element is in, say, the upper 5% of the distribution, then we have good reason to reject the null hypothesis (that the variable has no real association with profitability correlation and any observed relationship is just coincidence).

variables.[7] Likewise, we perform a factor analysis on $\mathbf{AvgDev_{kk'}}$. We then use the underlying factors, not the individual elements of $\mathbf{NatSim_{kk'}}$ and $\mathbf{AvgDev_{kk'}}$, on the right-hand side of the multivariate regression.

4.3 Variance Decomposition

To test hypotheses 4-6, we must decompose the variance in profitability in each country into distinct components. (See Searle *et al.* (1992) for a survey of variance decomposition techniques.) In principle, it is straightforward to break down the variance in r_{jt} and isolate $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$. Starting with Equation 2, one makes a strong set of distributional assumptions: each γ_{kt} is posited to be drawn independently from an underlying distribution with variance $\sigma_{\gamma k}^2$, each α_{ik} independently from a distribution with $\sigma_{\alpha k}^2$, each δ_k independently from a distribution with $\sigma_{\delta k}^2$, and each ε_{kt} independently from a distribution with $\sigma_{\varepsilon k}^2$. Note that covariation across the effects is suppressed entirely; industry and firm effects are assumed to be drawn independently, for instance. Under such assumptions, quadratic forms of the observations are linear combinations of μ_k^2, $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$. It is easy to compute from equation 2, for instance, that

$$E\{(\Sigma\, r_{jt}^2) / N_k\} = \mu_k^2 + \sigma_{\gamma k}^2 + \sigma_{\alpha k}^2 + \sigma_{\delta k}^2 + \sigma_{\varepsilon k}^2 \qquad (5)$$

where N_k is the total number of observations for country k. By choosing and computing five quadratic forms, one can generate five equations in the four unknown variances and in μ_k^2 and solve for the variance components. This quadratic-form approach constitutes the first way in which we calculate variance components in each country.

In practice, matters are not so straightforward. U.S.-focused variance decomposition studies have sparked a host of methodological disagreements. See Bowman and Helfat (2001), Brush *et al.* (1999), McGahan and Porter (1999), and Rumelt (1998) for particularly clear and comprehensive surveys of these debates. We focus on four particular concerns. In considering

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[7] Specifically, factor analysis estimates the model:

$$NatSim_{m,kk'} = \phi_{m1}\, f_{1,kk'} + \phi_{m2}\, f_{2,kk'} + \ldots + \phi_{mn}\, f_{n,kk'} + \omega_{m,kk'}$$

where $NatSim_{m,kk'}$ is the m^{th} element of $\mathbf{NatSim_{kk'}}$, $f_{1,kk'}$ through $f_{n,kk'}$ are the underlying factors, and the ϕ's are "factor loadings" that reflect the role of each factor in producing the m^{th} element of $\mathbf{NatSim_{kk'}}$. A similar analysis is carried out for $\mathbf{AvgDev_{kk'}}$. See Harman (1976) for a review of factor analysis. We use the principal factor method to perform the factor analysis.

them, our overarching approach is to calculate results with a wide range of methodologies and look for robust findings.

First, the simple quadratic-form method described above provides no guarantee that variance estimates will be positive, nor does it give any way to assess the statistical significance of the estimates. One can, however, resort to a maximum-likelihood alternative that restricts estimates to be positive and provides standard errors for the estimates. The cost of the alternative, however, is that one must make additional distributional assumptions, specifically that the various effects are drawn from a normal distribution. This maximum-likelihood approach is the second way in which we calculate variance components.

Second, recall that in Equation 2, the transient effect ε_{jt} affects profitability in period t, but then fades entirely by the next period. It is possible, of course, that the effects of transient shocks actually endure for more than one year. If this occurs in reality and one does not account for the possibility, the ramifications for variance decomposition can be severe. The lasting part of transient shocks (ε_{jt}) will then be attributed incorrectly to other effects, particularly to firm fixed effects (δ_j). Accordingly, firm effects may look much more important and transient errors less important than they are; that is, $\sigma_{\delta k}^2$ may be seriously overestimated and $\sigma_{\varepsilon k}^2$ substantially underestimated. To avoid this error, McGahan and Porter (1997) allow ε_{jt} to follow an AR(1) process:

$$\varepsilon_{jt} = \rho\, \varepsilon_{jt-1} + \omega_{jt} \qquad (6)$$

where ω_{jt} represents a truly new shock that arrives each period. We likewise permit such an AR(1) process, estimating the persistence parameter along with variance components in a maximum likelihood framework. This approach is the third manner in which we estimate $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$.[8]

The third concern often raised in the literature is that variance decomposition requires very strong assumptions about the independence of year, industry, firm, and transient effects. Many studies address this concern by supplementing variance decomposition with nested ANOVA (McGahan and Porter 1997, Rumelt 1991, Schmalensee 1985) or conventional ANOVA (Furman 2000, McGahan and Porter 1999) techniques that permit richer covariation

[8] The U.S. sample was too large to allow estimation by this method, even with a state-of-the-art workstation. We split the U.S. sample into ten equal-sized sub-samples, performed the estimation on each sub-sample, and found very similar results across the sub-samples. The results reported below are averages across the ten sub-samples.

among effects. However, Rumelt (1998) argues persuasively that ANOVA techniques do not truly isolate $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$. Accordingly, while we acknowledge that the independence assumptions are unfortunate, we know of no good way to avoid them.

Finally, variance decomposition techniques are highly sensitive to outliers (Brush and Bromiley 1997, McGahan and Porter 1999). If extreme values of ROA are clustered among a handful of firms, for instance, this will greatly boost the "explanatory power" of firm effects and inflate $\sigma_{\delta k}^2$. Likewise, the presence of a few extreme outliers spread across firms, industries, and years can boost the importance of transient errors and hence raise $\sigma_{\varepsilon k}^2$. The addition or exclusion of a handful of outlying observations can shift the relative sizes of $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$ dramatically. As noted above, in many of the countries we examine, we do observe extreme outliers and ROA distributions that are non-normal with thick tails. To deal with this issue, we re-run the three versions of variance decomposition (quadratic-form, maximum likelihood, and maximum likelihood with AR(1) transient effect) on data sets that are forced to have normal distributions. In particular, for each country, we rank observations from highest ROA (#1) to lowest (N_k), then replace the ROA of each observation with

$$rnorm_{jt} = \Phi^{-1}(rank / (N_k + 1)) \qquad (7)$$

where $\Phi^{-1}(\bullet)$ is the inverse of the normal cumulative distribution function. We then seek results that are robust to this normalization.

Beyond these concerns, which are generic to variance decomposition studies, we face two issues particular to our data. First, we lack the data to distinguish corporate parent effects from business unit effects. U.S.-focused variance decomposition studies typically break diversified firms (e.g., Walt Disney) into business units (e.g., studios, amusement parks, and consumer goods), collect profitability data at the business unit level, add a corporate parent effect to Equation 1, and isolate the portion of variance due to differences in the quality of corporate parenting. Unfortunately, our broad international data set does not provide profitability data below the level of the aggregate corporation. How then do we expect the variance of our firm effects to compare to the variance of business unit effects observed in the U.S.? Our higher level of aggregation could boost or reduce the variance compared to the U.S. On one hand, our firm effects incorporate variation due both to corporate parent differences and to business unit differences. This could boost $\sigma_{\delta k}^2$. On the other hand, to the extent that the firm effects we observe are averages over underlying, independently drawn business unit effects, the $\sigma_{\delta k}^2$ we observe may be depressed; the variance over a set of averages is less than the variance over the independent items that make up the averages.

The second issue specific to our data set concerns the coarseness of our industry classifications. As noted above, Datastream industry codes are not as fine-grained as the 4-digit SIC codes used in most U.S. studies. The industries we observe are composites of 4-digit SIC codes. As a result, the α_i's we observe are averages over the industry effects observed in U.S. studies. Under the maintained assumption that industry effects are drawn independently from some underlying distribution, averaging will depress the $\sigma_{\alpha k}^2$ we observe.[9]

Having decomposed variance in each country in six ways—three methods on actual data and three methods on normalized data—we are prepared to test Hypothesis 4, that variance components are similar across countries. In particular, we test for statistically significant differences across pairs of countries, adjusting our tests for the multiple comparisons we make.

4.4 Variance Components and National Similarity

Hypothesis 5 posits that pairs of countries with similar national characteristics will exhibit particularly similar variance structures. Hypothesis 6 proposes that higher average levels of institutional development will lead to greater similarity (lower differences in variance components). To test this, we proceed much as we did for Hypotheses 2 and 3. In addition to examining bivariate correlations, we run a multivariate regression in which the unit of analysis is the country dyad:

$$\text{VarDistance}_{kk'} = \eta + \boldsymbol{\beta}'\mathbf{NatSim}_{\mathbf{kk'}} + \boldsymbol{\mu}'\mathbf{AvgDev}_{\mathbf{kk'}} + \upsilon_{kk'}. \qquad (8)$$

Here $\text{VarDistance}_{kk'}$ is a measure of how different are the variance structures of countries k and k'; η, $\boldsymbol{\beta}$ and $\boldsymbol{\mu}$ are coefficients to be estimated; and $\upsilon_{kk'}$ is a residual error. To measure how different the variance structure of two countries are, we take a simple Euclidean distance:

$$\text{VarDistance}_{kk'} = \text{sqrt}[(\sigma_{\gamma k}^2 - \sigma_{\gamma k}^2)^2 + (\sigma_{\alpha k}^2 - \sigma_{\alpha k}^2)^2 + (\sigma_{\delta k}^2 - \sigma_{\delta k}^2)^2 + (\sigma_{\varepsilon k}^2 - \sigma_{\varepsilon k}^2)^2]. \qquad (9)$$

[9] If industry effects are not drawn independently, the identification of industries at a coarser level of aggregation may in fact boost $\sigma_{\alpha k}^2$. This may occur, for instance, if the 4-digit SIC industries within each Datastream industry have industry effects that are very similar to one another.

In calculating this distance, we use $\sigma_{\gamma k}{}^2$, $\sigma_{\alpha k}{}^2$, $\sigma_{\delta k}{}^2$, and $\sigma_{\varepsilon k}{}^2$ estimated in each of the six ways described above. We then look for robust relationships between $\mathbf{NatSim_{kk'}}$ and $\mathbf{AvgDev_{kk'}}$ on one hand and different versions of $\text{VarDistance}_{kk'}$ on the other.

The regression raises similar issues to the ones raised in Section 4.2. First, the dependent variable is bounded below by zero. Accordingly, we use a left-censored regression instead of ordinary least squares. Second, because the unit of analysis is the dyad, we use the Quadratic Assignment Procedure (QAP) to assess significance. Third, because the left-hand-side variable in Equation 9 is derived from estimates, we weight observations in Equation 8 by $1/(1/N_k + 1/N_{k'})$. Finally, we use the same factor analysis described above to reduce the dimensions of $\mathbf{NatSim_{kk'}}$ and $\mathbf{AvgDev_{kk'}}$.

5. Results

5.1 Correlations in Industry Profitability

Hypothesis 1 posits that industry profitability figures are highly correlated across pairs of countries; that is, $\text{IndCor}_{kk'}$ is positive and significant for the preponderance of country dyads. In Figure 2, a red block indicates that $\text{IndCor}_{kk'}$ is significantly positive at the 10% level for row country k and column country k'. A blue block reflects a significantly negative correlation, and a yellow block indicates an insignificant relationship. Hypothesis 1 suggests that Figure 2 should be awash in red, which is not the case. Indeed, there are not many more red blocks than we would expect to arise by chance. The correlation in industry profitability for the average pair of countries is merely 0.095. Hence we find little support for Hypothesis 1.

5.2 Correlations in Industry Profitability, National Similarity, and Development

Hypotheses 2 and 3 suggest that the red blocks in Figure 2 do not arise at random locations. Rather, they appear for pairs of countries with similar national characteristics and high levels of institutional development. We find strong support for these propositions. Table 3 shows bivariate correlations between $\text{IndCor}_{kk'}$ and individual elements of $\mathbf{NatSim_{kk'}}$ and $\mathbf{AvgDev_{kk'}}$. As anticipated by Hypothesis 2, differences in per-capita GDP, telephone density, respect for the rule of law, currency liberality, black-market premiums, and corruption levels are associated with lower correlations in industry profitability. Countries that are members of the same "civilization" display significantly higher correlations. In support of Hypothesis 3, we see convergence in profitability patterns as dyads attain higher per-capita GDP, more education, higher telephone density, greater access to technology, greater respect for the rule of law, more liberal currency regimes, lower black-market premiums, and less corruption. The sole surprise is that differences in the intensity of foreign trade is associated with higher correlations.

Tables 4 and 5 show the results of factor analysis on $\mathbf{NatSim_{kk'}}$ and $\mathbf{AvgDev_{kk'}}$, respectively. The analysis of $\mathbf{NatSim_{kk'}}$ exhibits three prominent factors: the first weighted on general differences in levels of national development; the second emphasizing physical proximity, membership in the same free trade zone, and roots in a common civilization; and the third reflecting strong differences in currency regimes and black-market premiums. We interpret these as differences in development, physical and cultural proximity, and differences in currency openness. $\mathbf{AvgDev_{kk'}}$ displays a single dominant factor, reflecting the average level of development in the dyad (not the difference in development within the dyad).

We expect larger differences in development and currency openness to be associated with lower profitability correlations and greater physical and cultural proximity and average development to be associated with higher correlations. Bivariate and multivariate relationships reported in Table 6 are consistent with these expectations. In support of Hypotheses 2 and 3, all relationships have the expected sign, and many are statistically significant.

5.3 Variance Decomposition

Tables 7 and 8 show variance decomposition results for the three decomposition techniques with unnormalized data. Table 7 displays the raw estimates of $\sigma_{\gamma k}^2$, $\sigma_{\alpha k}^2$, $\sigma_{\delta k}^2$, and $\sigma_{\varepsilon k}^2$. U.S.-focused studies usually report the variance components in terms of percentages of $\sigma_{\gamma k}^2 + \sigma_{\alpha k}^2 + \sigma_{\delta k}^2 + \sigma_{\varepsilon k}^2$. Percentage results are reported in Table 8.

Comparisons across the methods reveal a number of patterns. First, the quadratic-form and maximum likelihood techniques produce results that are quite similar. In Table 7, the median absolute difference between the two techniques is 0.4% for year effects, 2.9% for industry effects, and 5.3% for firm effects. Addition of the AR(1) error process shifts year effects and industry effects only modestly in the median case (though some individual changes are substantial). However, the AR(1) process causes firm effects to drop and transient effects to rise dramatically, as anticipated in the methodology discussion above. The median portion of variance attributable to firm effects plunges from 44.7% to 9.2%, while the portion attributable to transient effects rises from 37.2% to 70.5%. It is tricky, yet crucial, to interpret this drop correctly. The decrease in $\sigma_{\delta k}^2$ implies that much of the firm effect observed under the second technique is in fact not a permanent firm effect but the persistent part of a set of slowly fading, firm-specific shocks. If one asks what portion of variance is due to firm effects that are truly permanent, the answer appears to be 9.2% in the median country. But if one wants to include long-lived, albeit impermanent, firm-specific shocks under the umbrella of "firm effects," then firm effects appear to account for 44.7% of variance.

Although the third technique boosts transient effects and depresses firm effects, it does so fairly uniformly across countries. As a result, the cross-country correlations of effects across techniques is very high. Table 9 shows this for the three techniques explored in Tables 7 and 8 as well as the same three techniques with normalized data. Correlations are high and, in nearly all cases, statistically significant at the 1% level. This suggests that our tests for Hypotheses 5 and 6 should be fairly insensitive to the variance decomposition technique we choose. There is, however, one important exception to this pattern: estimates of $\sigma_{\varepsilon k}^2$ with unnormalized and normalized data have virtually no correlation with one another. Consistent with the methodology discussion, this suggests that estimates of $\sigma_{\varepsilon k}^2$ are driven largely by a handful of outliers which are "drawn back in" by normalization.

We now turn from comparisons across variance decomposition techniques to comparisons across countries—the heart of Hypothesis 4. On their face, the variance components of the countries appear quite different from one another. We confirm this impression with a statistical test: using results from the third technique with unnormalized data, we conclusively reject the hypothesis that variance components are similar across countries. Despite this rejection, we note a handful of similarities across countries. Nearly universally, transient effects are statistically significant. In contrast, year effects are almost never significant. (The one exception is in the U.S., where year effects account for a significant but tiny portion of variance.) Firm effects are usually significant under the second technique but not nearly so often under the third.

Under the first and second variance decomposition techniques, firm effects account for the largest portion of variance in almost all countries, and industry effects are more substantial than year effects in two-thirds of the countries (see Table 10). The ranking "Firm ≥ Industry ≥

Year" appears in a narrow majority of countries. However, when an AR(1) process is added so that firm effects are narrowed to include only permanent influences, it is no longer true that firm effects dominate other sources of variance. The ranking "Firm ≥ Industry ≥ Year" continues to be the most common pattern we observe, but it is far from valid around the world.

Our results for the U.S. are similar to those reported in the most prominent and comparable studies of the U.S. With variance decomposition techniques, Rumelt (1991) and McGahan and Porter (1997) uncover year effects that account for 0.4% - 2.4% of total variance; stable industry effects that account for 7.2% - 18.7%; corporate and firm effects that together account for 35.8% - 54.7%; and errors that account for 36.9% - 53.5% (see McGahan and Porter 1997, Table 3). With our third variance decomposition technique, the one closest to that used by McGahan and Porter (1997), we find comparable figures: 0.2%, 6.1%, 47.5%, and 46.3%, respectively. We suspect the low industry figure is a result of the coarse industry definitions we use. Indeed, when we re-run the U.S. analysis with 4-digit SIC codes, the portion of variance accounted for by industry effects rises to 10.3%, in line with prior studies.

5.4 Variance Components, National Similarity, and Development

We turn finally to Hypotheses 5 and 6: though variance components are significantly different across countries, perhaps they are more similar in pairs of countries whose national characteristics resemble one another or in pairs of advanced economies. As described above, we look for elements of $\mathbf{NatSim}_{kk'}$ and $\mathbf{AvgDev}_{kk'}$ that are robustly related to $\text{VarDistance}_{kk'}$. In bivariate relationships between $\text{VarDistance}_{kk'}$ and individual elements of $\mathbf{NatSim}_{kk'}$ and $\mathbf{AvgDev}_{kk'}$ (Table 11), we see virtually no results that are robust across different estimates of $\text{VarDistance}_{kk'}$. There is some indication that countries in which governments account for very different shares of GDP display very different variance structures, consistent with Hypothesis 5.

Table 12 summarizes our search efforts with the factors identified in the factor analysis above. Pairs of countries that are physically or culturally close appear to have similar variance components, but this result disappears once one normalizes the ROA data. Pairs of countries with very different currency regimes appear to have similar variance components, to our surprise, but this result vanishes altogether after normalization or in multivariate regressions. Overall, we see no robust support for Hypotheses 5 or 6.

In both Tables 11 and 12, we observe a positive relationship between $\text{VarDistance}_{kk'}$ and $\mathbf{AvgDev_{kk'}}$ with unnormalized data and the expected negative relationship with normalized data. The positive relationship when unnormalized data are used seems to driven by the following. Recall from Section 3.3 that highly developed nations account for some of the countries with the most outliers and some of the countries with the least. In unnormalized data, this results in a handful of dyads with very high levels of average development and very different estimates of $\sigma_{\varepsilon k}^2$ (and hence very high values of $\text{VarDistance}_{kk'}$). These dyads generate the positive relationship. Once the outliers are "drawn in" by normalization, the positive relationship disappears and, in some cases, becomes significantly negative.

6. Discussion and Conclusion

Though local contingency has its proponents among strategy scholars (e.g., Porter 1990), we feel that global determinism holds de facto sway over most research in the field. In searching for the roots of differences in profitability, empirical researchers have focused in the past on a handful of similar, advanced economies. This focus itself reflects an implicit confidence that such economies can reveal patterns that hold true more broadly. Moreover, studies of advanced economies have produced fairly consistent results concerning industry profitability and variance components. Such consistency has predisposed the field to accepting that there exist universal "facts" about patterns in profitability.

To the contrary, the "facts" that we examine do not travel well at all from one country to another. Using data from the late 1980s to the late 1990s in a set of 43 countries with very diverse national characteristics, we show that the correlation of profitability of industries across pairs of countries is close to zero. Pairs of countries that display greater similarity in tastes, technologies, and institutions have higher correlations, as do pairs of more advanced countries. These later results are consistent with previous studies' findings that industry structure differs only modestly among relatively similar, advanced economies. In some sense, we are able to exploit the variation in data across a set of countries more institutionally varied than has been examined before. Across this broad set, the local contingency perspective holds up better than global determinism.

“Facts” regarding variance decomposition travel even worse that do facts about industry-average profitability. Depending on the estimation technique used, no more than half of our countries display the familiar U.S. result, firm effects ≥ industry effects ≥ year effects. In contrast to our results concerning the correlation of industry profitability, we are also unable to account for dissimilarity in variance components using proxies for countries' tastes, technologies, and institutions. On a methodological note, given the strategy field's interest in variance decomposition techniques, it is worth emphasizing that such techniques are quite sensitive to outliers. For this reason, we find it important to check the robustness of results using normalized data, an approach we recommend for future work.

Any large-sample, cross-country study of our sort suffers from some data problems. Here, we highlight three issues that point to opportunities for future work.

First, we do not have data to measure corporate effects across the range of countries. This should not affect our analysis of industry profitability correlations, and there is no *a priori* reason to expect that our measures of *differences* in variance composition will be biased in a particular direction by the omission of such corporate effects. As discussed above, however, the omission will affect the partitioning of variation in firm profitability into the categories that we consider. It would be worthwhile to extend our research with an international data set in which corporate results are broken down by business unit. Furman (2000) accomplishes this in a sample of four advanced economies.

Second, though we try to understand how differences in tastes, technologies, and institutions relate to the structure of profitability, we lack proxies that can separate the effect of each of these three buckets from the others'. It would be interesting to know, for instance, how much of the differences we observe across countries is due to differences in technology, which might fade with development, and how much is due to institutional distinctions, which are arguably more persistent. Separating the effects will be difficult because tastes, technologies, and institutions doubtlessly interact with one another richly as they affect profitability. For example, institutional characteristics might well affect the kinds of technologies that a country generates or absorbs (Nelson 1993), which in turn will affect industry structure and profitability. Natural experiments with exogenous shocks to one or more of these buckets are more likely to be successful in delineating the effects of each class of national characteristics. Unanticipated opening-up of economies (Sachs and Warner 1995) can provide a nice setting to study the effects of variation in some institutional characteristics, for instance.[10]

Our third and final concern is that we lack a systematic method to treat multinationals in a manner distinct from purely domestic firms.[11] Arguably, the profitability of a multinational is less sensitive to the tastes, technologies, and institutions of its home country than is the profitability of a company operating only in a particular country. This issue is tempered by the observation that several studies have found a substantial home country effect for multinational strategies (Elg 2000, Kostova and Zaheer 1999, Zaheer 1995). The concern is amplified by the fact that, in some instances, identifying a home country might be problematic.

Some variants of this issue should also be noted. In the industry profitability analysis, it might be worth distinguishing between explicitly global industries and those that are much more domestic. In addition, firms that are domiciled almost entirely in a single country might increasingly look to the institutions of other countries to raise capital or to source talent. The spate of recent depositary receipt issues in London and New York by companies from developing countries is a case in point (Karolyi and Foerster 1999). In some sense, a sensible interpretation of the sizeable cross-country differences that our analysis uncovers is that such cross-border transactions are not salient enough to erode country-specific influences.

We truly view these concerns as opportunities for future research, not merely as limitations to the present paper. More generally, international comparisons represent a barely-tapped opportunity for scholars who seek the roots of profitability differences. Many popular prophets of globalization predict that—with burgeoning cross-border trade and improved technology for communications and transportation—local tastes, technologies, institutions, traditions, cultures, governments, and so forth will matter less and less. We see little reflection of this in our analyses. It is certainly true, however, that globalization has improved the ability of scholars to obtain local data on profitability from a wide range of countries. The availability of data and the persistence of local differences, together, create an opportunity for researchers. We can examine how, and how much, local differences generate the variance in profitability we

[10] Ghemawat and Khanna (1998) and Fisman (2000) provide examples of ways in which unanticipated events can be used to infer the effects of particular institutions.

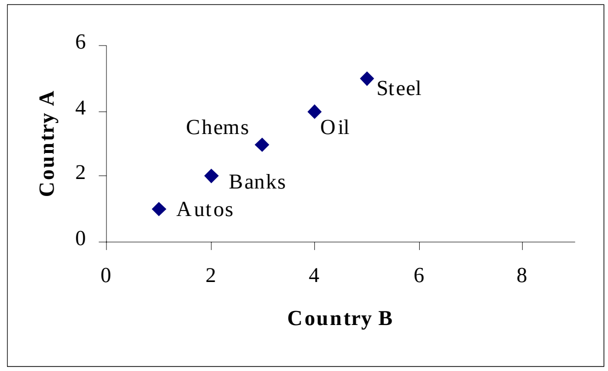
[11] Our study is not the first to suffer from inadequate attention to delineating the effects of multinational presence; Sutton (1991, p. 318) offers a similar observation about his own work.

observe. Moreover, international comparisons offer an important, unexplored source of variation: institutional differences. By examining the effects of strategic choices on profitability in a variety of institutional settings, we can tease out more fully the precise way in which strategy generates differences in profitability.

FIGURE 1: RELATIONSHIP BETWEEN VARIANCE COMPONENT HYPOTHESES AND INDUSTRY PROFITABILITY HYPOTHESES

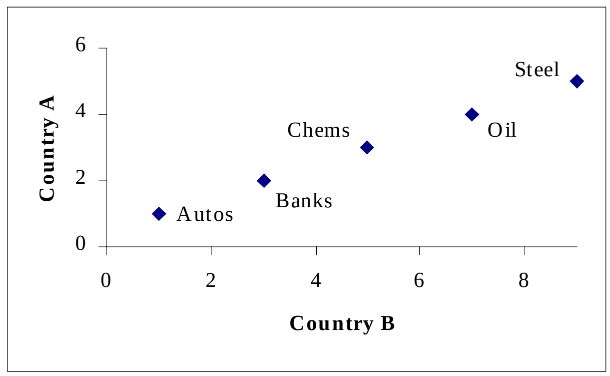
Panel A

	Average profitability	
Industry	Country A	Country B
Autos	1.0	1.0
Banks	2.0	2.0
Chems	3.0	3.0
Oil	4.0	4.0
Steel	5.0	5.0
σ_{ik}^2	2.5	2.5



Panel B

	Average profitability	
Industry	Country A	Country B
Autos	1.0	1.0
Banks	2.0	3.0
Chems	3.0	5.0
Oil	4.0	7.0
Steel	5.0	9.0
σ_{ik}^2	2.5	10



Panel C

	Average profitability	
Industry	Country A	Country B
Autos	1.0	3.0
Banks	2.0	1.0
Chems	3.0	5.0
Oil	4.0	4.0
Steel	5.0	2.0
σ_{ik}^2	2.5	2.5

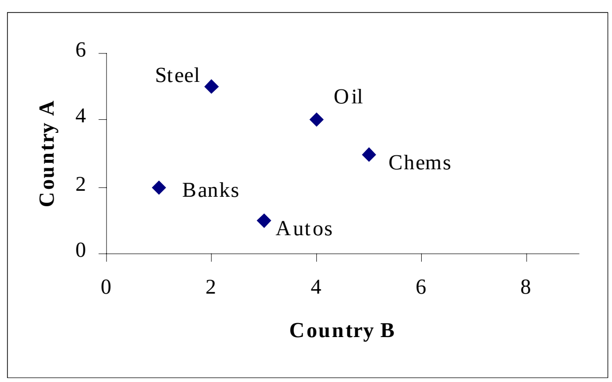


FIGURE 2: CORRELATION IN INDUSTRY PROFITABILITY

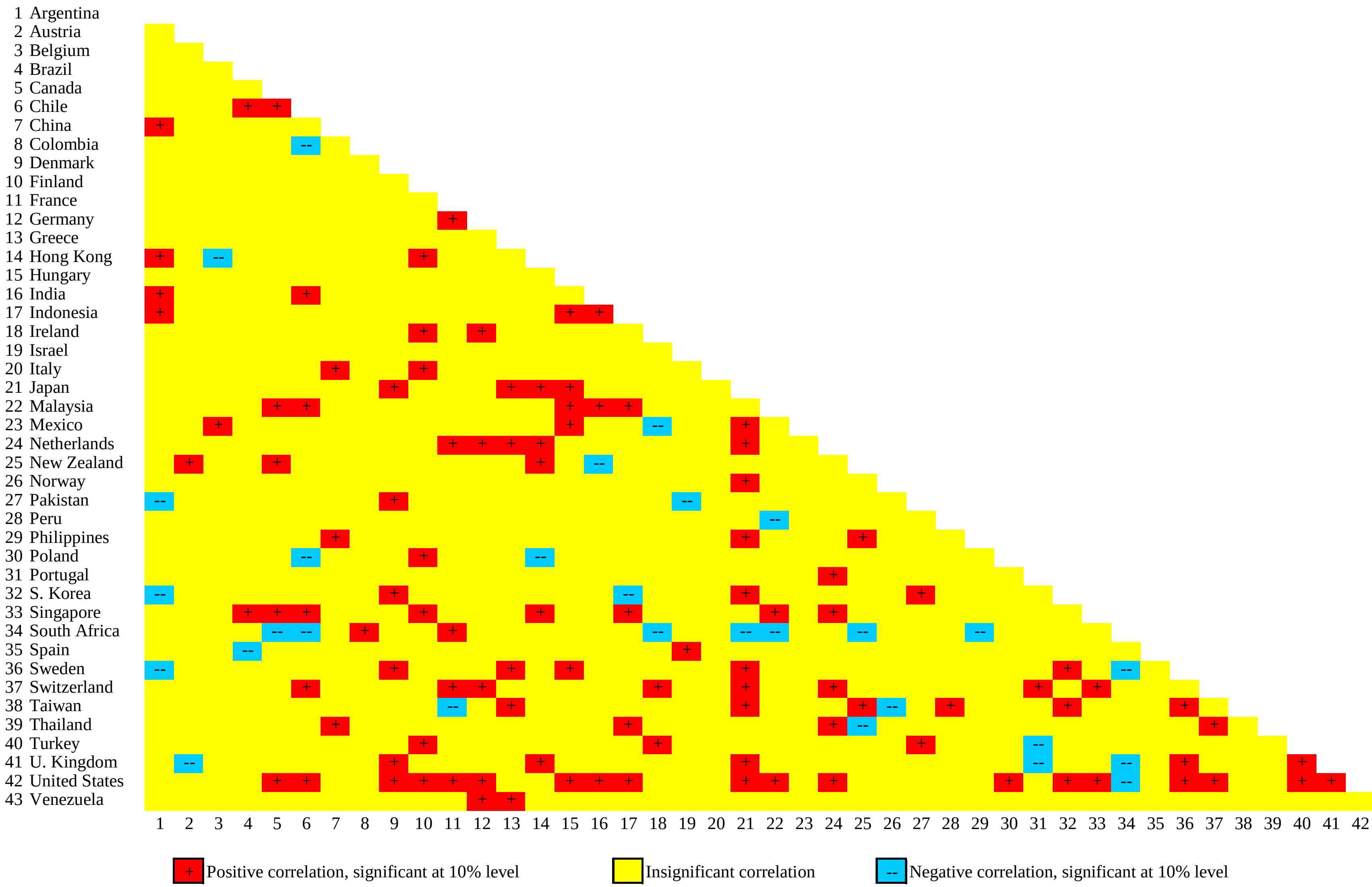


TABLE 1: DESCRIPTION OF DATA BY COUNTRY

			ROA (%)						
Country	Obs	Years	Mean	Median	Vari-ance	Skew-ness	Kurtosis	Min	Max
Argentina	152	1988-97	6.3	6.0	68.0	-1.0	9.3	-40.4	29.7
Austria	342	1987-97	4.1	4.1	42.1	0.9	15.1	-34.6	40.0
Belgium	238	1987-97	6.5	6.2	22.4	0.5	3.6	-7.3	25.1
Brazil	649	1988-97	4.3	3.7	69.9	-0.1	9.6	-57.7	43.8
Canada	3,195	1989-97	5.2	6.7	170.0	-6.0	107.7	-299.2	51.4
Chile	361	1988-97	10.7	9.2	51.9	0.9	3.9	-10.1	36.9
China	238	1989-97	6.3	5.7	25.3	0.8	4.1	-4.4	25.7
Colombia	108	1988-97	5.0	4.1	97.0	0.1	4.8	-25.3	37.6
Denmark	390	1987-97	6.7	7.0	36.9	-0.4	7.0	-27.7	32.4
Finland	408	1988-97	7.7	7.3	35.9	0.8	7.5	-17.6	38.0
France	1,772	1987-97	6.8	6.5	39.5	0.4	7.3	-28.8	51.1
Germany	4,473	1987-97	6.2	6.0	122.7	-0.2	22.7	-118.2	148.4
Greece	439	1988-97	8.9	9.6	80.7	-1.1	7.5	-47.0	32.0
Hong Kong	1,410	1992-97	6.6	6.0	91.3	-1.3	16.8	-103.4	47.8
Hungary	66	1992-97	5.3	8.0	121.2	-1.2	5.0	-36.0	21.2
India	1,308	1988-97	9.6	8.9	69.7	-0.1	8.5	-52.5	54.2
Indonesia	688	1992-97	9.4	8.6	67.3	-0.2	18.8	-67.2	59.5
Ireland	71	1988-97	5.5	8.0	101.7	-5.7	40.0	-67.3	12.1
Israel	88	1992-97	9.2	8.9	51.5	0.9	5.5	-6.9	34.2
Italy	385	1988-97	5.1	4.8	27.5	1.3	9.6	-11.0	38.5
Japan	13,370	1987-97	4.1	4.0	17.6	-0.2	16.7	-44.3	53.0
Malaysia	1,665	1990-97	8.7	8.5	61.4	0.2	8.1	-38.0	61.0
Mexico	327	1988-97	7.8	7.4	43.9	-1.5	16.9	-47.1	25.8
Netherlands	491	1990-97	10.3	9.9	41.6	0.9	6.7	-15.6	42.6
New Zealand	370	1992-97	7.7	8.4	160.8	-1.7	12.5	-73.2	50.2
Norway	621	1988-97	4.3	5.3	103.2	-2.9	23.2	-84.8	33.0
Pakistan	390	1988-97	11.3	10.7	70.7	-0.2	3.6	-18.7	33.5
Peru	126	1988-97	5.5	4.5	183.7	-0.5	5.1	-50.9	39.7
Philippines	394	1992-97	6.0	4.9	149.1	-0.2	10.2	-73.1	64.1
Poland	81	1992-97	12.8	12.8	79.8	-0.1	3.8	-16.2	34.9
Portugal	330	1988-97	0.1	0.0	3.0	-0.3	22.3	-11.6	9.0
S. Korea	1,847	1990-97	5.4	5.6	30.1	-1.1	12.3	-43.2	31.6
Singapore	840	1991-97	6.6	5.7	265.3	19.7	507.1	-49.0	422.4
South Africa	158	1992-97	6.7	0.0	105.4	1.7	6.3	-7.7	55.4
Spain	430	1987-97	8.0	7.5	36.0	0.3	6.8	-15.2	33.0
Sweden	1063	1987-97	5.7	7.1	166.3	-5.6	62.4	-169.6	36.7
Switzerland	681	1988-97	6.3	5.7	26.3	0.9	6.2	-17.4	31.7
Taiwan	564	1988-97	5.9	5.1	37.6	0.8	5.2	-18.4	33.0
Thailand	1406	1991-97	8.4	8.2	80.0	-0.9	11.7	-61.9	58.9
Turkey	263	1988-97	22.4	22.3	182.8	-0.1	2.9	-20.5	60.9
U. Kingdom	8,677	1987-97	7.1	8.6	183.3	-3.9	39.6	-243.7	70.4
United States	43,989	1988-97	6.2	8.1	233.9	-2.6	22.7	-208.7	203.4
Venezuela	61	1988-97	5.8	5.6	17.3	0.0	3.7	-5.7	17.8

TABLE 2: PROXIES FOR NATIONAL SIMILARITY AND AVERAGE DEVELOPMENT

Proxy	Description	Data source
SIMILARITY IN NATIONAL CHARACTERISTICS		
1. $\Delta GDP_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is the 1992 per-capita GDP in country k = a measure of dissimilarity in GDP per capita	*CIA World Factbook*
2. $\Delta Educate_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is the average number of years of schooling among the population in country k aged 25 or older in 1992 = a measure of dissimilarity in educational levels	Barro and Lee (1996)
3. $\Delta Phone_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is the number of telephones per 100 inhabitants in country k in 1992 = a measure of dissimilarity in the development of communications infrastructure	United Nations *Statistical Yearbook, 1993*
4. $\Delta Tech_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is a Likert-scale assessment of country k's access to technology as of 1997 = a measure of dissimilarity in technological sophistication. The assessment places each country into one of four regimes: technology innovator (score = 4; ten or more patents per million population), technology adopter (3; high-tech exports of at least 2% of GDP), technology adopter in part of the country (2), or technologically excluded (1)	Developed from Sachs (2000)
5. $SameCiv_{kk'}$	1 if countries k and k' are members of the same "civilization," 0 otherwise = a measure of cultural similarity. Huntington (1996) classifies each country into one of seven "civilizations" based on social, historical, and political analysis	Huntington (1996)
6. $\Delta RuleOfLaw_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is an assessment on a 10-point scale of the law and order tradition in country, averaged from 1982 to 1995 = a measure of dissimilarity in respect for the rule of law. The original assessment was produced by the country-risk rating agency International Country Risk.	La Porta *et al.* (1998)
7. $\Delta Currency_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is a Likert-scale assessment of how open is country k's currency regime in 1994 = a measure of dissimilarity in openness to currency flows. The assessment places each currency into one of four hierarchically ordered regimes—free, liberal, strict, or dictatorial—based on an analysis of currency regulations and restrictions	*World Currency Yearbook, 1990-1993*
8. $\Delta Trade_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is (imports + exports) / GDP in country k in 1992 = a measure of dissimilarity in openness to trade of goods and services	*World Development Report, 1994*
9. $\Delta GovShare_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is government consumption share of GDP in country k in 1992 = a measure of dissimilarity in government involvement in the economy	*World Development Report, 1994*
10. $\Delta BlackMkt_{kk'}$	$\ln[(1 + \max(X_k, X_{k'})) / (1 + \min(X_k, X_{k'}))]$ where X_k is the black-market premium of country k's currency in 1993 = a measure of dissimilarity in freedom of currency exchange	*World Currency Yearbook, 1990-1993*
11. $\Delta Clean_{kk'}$	$\ln[\max(X_k, X_{k'}) / \min(X_k, X_{k'})]$ where X_k is a survey-based measure of how prominent corruption is in country k in 1987 (high score implies little corruption) = a measure of dissimilarity in levels of corruption. The measure is constructed by Transparency International, a non-governmental organization dedicated to curbing corruption	Transparency International
12. $Distance_{kk'}$	Miles between capitals of countries k and k'	Atlas

13. $SameZone_{kk'}$	1 if countries k and k' are in the same free trade zone in 1992, 0 otherwise	Press reports
14. $SameLawOrig_{kk'}$	1 if the legal systems of countries k and k' have the same historical origin, 0 otherwise. La Porta *et al.* (1998) classify countries into four legal families—English, French, German, and Scandinavian—based largely on Reynolds and Flores (1989)	La Porta *et al.* (1998)
15. $SameAcctOrig_{kk'}$	1 if the accounting systems of countries k and k' have the same historical origin, 0 otherwise. Based on a factor analysis of 1973 data collected by Price Waterhouse, Nair and Frank (1980) place the accounting system of each country into one of models: British Commonwealth, Latin American, Continental European, and United States	Nair and Frank (1980)

AVERAGE DEVELOPMENT

16. $AvgGDP_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is the 1992 per-capita GDP in country k	*CIA World Factbook*
17. $AvgEducate_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is the average number of years of schooling among the population in country k aged 25 or older in 1992	Barro and Lee (1996)
18. $AvgPhone_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is the number of telephones per 100 inhabitants in country k in 1992	United Nations *Statistical Yearbook, 1993*
19. $AvgTech_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is the technology score described above	Sachs (2000)
20. $AvgRuleOfLaw_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is the rule-of-law score described above	La Porta *et al.* (1998)
21. $AvgCurrency_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is the currency regime score described above	*World Currency Yearbook, 1990-1993*
22. $AvgTrade_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is (imports + exports) / GDP in country k in 1992	*World Development Report, 1994*
23. $AvgGovShare_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is government consumption share of GDP in country k in 1992	*World Development Report, 1994*
24. $AvgBlackMkt_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is the black-market premium of country k's currency in 1993	*World Currency Yearbook, 1990-1993*
25. $AvgClean_{kk'}$	$(X_k + X_{k'}) / 2$ where X_k is the corruption score described above (high score implies little corruption)	Transparency International

TABLE 3: BIVARIATE CORRELATIONS BETWEEN INDCOR AND NATIONAL CHARACTERISTICS

	Expected sign	Actual sign
NatSim		
ΔGDP	-	---
ΔEducate	-	
ΔPhone	-	--
ΔTech	-	--
SameCivil	+	++
ΔRuleOfLaw	-	---
ΔCurrency	-	----
ΔTrade	-	++
ΔGovShare	-	
ΔBlackMkt	-	--
ΔClean	-	---
Distance	-	
SameZone	+	
SameLawOrig	+	
SameAcctOrig	+	
AvgDev		
AvgGDP	+	++++
AvgEducate	+	++++
AvgPhone	+	+++
AvgTech	+	+++
AvgRuleOfLaw	+	++++
AvgCurrency	+	++++
AvgTrade	+	
AvgGovShare	-	
AvgBlackMkt	-	--
AvgClean	+	+++

Significance levels based on QAP.
++ (or --): positive (or negative) and significant at 10% level.
+++ (or ---): positive (or negative) and significant at 5% level.
++++ (or ----): positive (or negative) and significant at 1% level.
Blank indicates insignificant correlation.

TABLE 4: FACTOR ANALYSIS ON **NATSIM**$_{kk'}$

	Factor 1: Difference in development	Factor 2: Physical & cultural proximity	Factor 3: Difference in currency openness	Uniqueness
Eigenvalue	4.80	1.00	0.74	
Factor Loadings on:				
ΔGDP	0.897	-0.115	0.183	0.094
ΔEducate	0.677	-0.060	0.279	0.400
ΔPhone	0.865	-0.169	-0.010	0.155
ΔTech	0.514	-0.007	0.286	0.530
SameCivil	-0.571	0.464	-0.138	0.394
ΔRuleOfLaw	0.739	-0.072	0.219	0.343
ΔCurrency	0.517	-0.114	0.588	0.320
ΔTrade	-0.097	-0.198	-0.068	0.805
ΔGovShare	0.185	-0.315	-0.290	0.746
ΔBlackMkt	0.220	-0.145	0.623	0.506
ΔClean	0.762	0.015	-0.026	0.374
Distance	0.113	-0.676	0.097	0.518
SameZone	-0.217	0.612	-0.095	0.549
SameLawOrig	-0.042	-0.013	0.123	0.882

TABLE 5: FACTOR ANALYSIS ON **AVGDEV**$_{kk'}$

	Factor 1: Average development	Uniqueness
Eigenvalue	6.07	
Factor loadings on:		
AvgGDP	0.905	0.073
AvgEducate	0.862	0.138
AvgPhone	0.948	0.032
AvgTech	0.811	0.267
AvgRuleOfLaw	0.928	0.130
AvgCurrency	0.835	0.149
AvgTrade	0.207	0.332
AvgGovShare	0.522	0.300
AvgBlackMkt	-0.576	0.313
AvgClean	0.860	0.098

TABLE 6: RELATIONSHIPS BETWEEN INDCOR AND FACTORS

	Expected sign	Actual sign
Bivariate		
Difference in development	-	-
Physical & cultural proximity	+	+
Difference in currency openness	-	----
Average development	+	++++
Multivariate		
Difference in development	-	---
Physical & cultural proximity	+	+
Difference in currency openness	-	--
Average development	+	++++

Significance levels based on QAP.
+ (or -): positive (or negative) but insignificant.
++ (or --): positive (or negative) and significant at 10% level.
+++ (or ---): positive (or negative) and significant at 5% level.
++++ (or ----): positive (or negative) and significant at 1% level.

TABLE 7: VARIANCE DECOMPOSITION RESULTS: RAW VARIANCE COMPONENTS (POINTS OF ROA^2)

	1. Quadratic-form				2. Max. Likelihood				3. Max. Likelihood + AR(1)				
Country	Year	Ind	Firm	Trans	Year	Ind	Firm	Trans	Year	Ind	Firm	Trans	ρ
Argentina	1.2	14.4	-1.4	54.8	1.5	13.8	0.0	**54.1**	0.0	0.0	0.0	**72.0**	**0.61**
Austria	0.1	4.1	22.3	16.5	0.1	14.7	**22.8**	**16.5**	0.2	10.9	9.5	**31.0**	**0.72**
Belgium	1.4	0.6	15.0	6.1	1.6	2.6	**12.1**	**6.1**	0.8	2.6	9.3	**12.0**	**0.73**
Brazil	5.9	6.0	11.8	47.3	6.6	1.8	**16.8**	**47.4**	6.4	2.6	6.5	**59.4**	**0.44**
Canada	2.1	15.1	87.6	66.2	2.1	**29.8**	**191.1**	**68.1**	1.9	**28.8**	**170.1**	**87.0**	**0.44**
Chile	5.0	3.3	24.2	20.8	6.9	2.8	**22.2**	**20.7**	4.5	1.3	7.6	**37.3**	**0.72**
China	3.7	0.2	8.5	13.8	4.5	0.8	**10.0**	**14.9**	2.8	0.3	0.0	**25.8**	**0.66**
Colombia	24.7	32.9	13.1	32.5	27.9	18.4	30.0	**32.8**	6.8	5.6	0.0	**79.5**	**0.80**
Denmark	1.0	6.0	14.5	16.1	1.2	6.1	**21.2**	**16.4**	0.5	7.8	4.0	**30.8**	**0.70**
Finland	4.5	-2.5	19.0	15.7	6.7	3.0	**15.6**	**15.9**	5.4	2.0	0.0	**32.8**	**0.72**
France	2.0	1.0	20.4	16.4	2.2	1.4	**23.7**	**16.6**	1.4	1.3	4.2	**35.3**	**0.79**
Germany	1.6	12.4	64.5	45.1	1.5	**12.5**	**80.3**	**45.3**	1.1	**12.3**	**57.6**	**63.2**	**0.59**
Greece	8.6	5.4	39.7	29.0	14.2	7.3	**40.8**	**29.0**	5.1	6.8	2.9	**65.0**	**0.76**
Hong Kong	5.6	4.4	42.4	40.2	6.4	4.5	**48.4**	**40.6**	7.0	4.3	0.0	**91.9**	**0.71**
Hungary	-0.6	-7.5	89.5	43.7	0.0	13.2	63.1	**42.7**	0.8	13.1	0.0	**107.7**	**0.78**
India	1.8	6.8	34.6	27.3	2.2	7.3	**36.4**	**27.2**	2.1	6.9	**17.0**	**49.5**	**0.66**
Indonesia	2.9	10.4	27.4	27.8	3.2	**13.2**	**27.5**	**27.7**	2.5	9.2	0.0	**61.3**	**0.72**
Ireland	-4.5	73.5	-8.9	57.1	0.0	121.6	0.0	**48.9**	0.3	140.0	0.0	**71.9**	**0.63**
Israel	3.9	6.9	27.4	16.1	4.0	0.0	**32.9**	**15.9**	3.2	0.0	17.7	31.4	**0.67**
Italy	0.5	4.8	13.8	8.9	0.6	14.4	**15.4**	**9.0**	0.2	9.2	0.0	**24.9**	**0.85**
Japan	1.5	1.1	8.3	7.0	1.4	**1.7**	**8.9**	**7.0**	**1.3**	**1.7**	**3.8**	**12.4**	**0.78**
Malaysia	1.9	9.6	25.1	25.8	1.5	**10.2**	**26.1**	**25.7**	1.5	**8.9**	0.0	**55.0**	**0.73**
Mexico	0.6	-7.1	32.5	18.2	0.5	0.0	**45.6**	**19.1**	0.0	0.0	0.0	**66.4**	**0.88**
Netherlands	0.6	9.8	21.2	10.7	0.7	7.5	**28.7**	**10.7**	0.5	10.7	6.8	**30.0**	**0.78**
New Zealand	2.9	40.2	47.2	72.9	2.9	**37.7**	**46.7**	**72.5**	2.4	**37.8**	**36.7**	**82.7**	**0.23**
Norway	1.1	31.5	17.6	57.2	1.1	**78.1**	**18.8**	**57.6**	0.9	**81.3**	9.3	**68.7**	**0.37**
Pakistan	2.9	6.6	26.9	35.7	2.7	6.2	**27.6**	**35.9**	1.8	6.4	0.0	**65.4**	**0.73**
Peru	14.1	-61.8	145.7	86.0	17.7	0.0	**93.3**	**86.4**	18.3	0.0	68.5	**111.8**	**0.45**
Philippines	2.7	33.6	19.5	96.6	5.2	**32.8**	**21.4**	**93.1**	3.2	**33.0**	8.9	**107.8**	**0.27**
Poland	8.4	4.8	37.2	33.1	11.6	6.7	34.0	**34.5**	6.9	5.0	0.0	**75.1**	**0.71**
Portugal	0.0	-1.2	2.7	1.4	0.0	0.0	**2.5**	**1.4**	0.0	0.0	**1.8**	**1.7**	**0.47**
S. Korea	0.6	2.9	10.9	16.0	0.6	**3.1**	**11.6**	**16.0**	0.4	**2.7**	1.7	**27.7**	**0.66**
Singapore	6.9	8.7	12.8	238.8	4.9	8.5	**23.2**	**230.9**	3.4	11.3	0.0	**271.6**	**0.37**
South Africa	1.8	12.7	64.4	30.0	1.2	11.0	**42.8**	**25.2**	0.5	9.8	18.7	**47.4**	**0.68**
Spain	1.6	2.1	15.5	17.4	1.7	0.0	**19.1**	**17.5**	1.3	0.0	**10.4**	**25.4**	**0.60**
Sweden	6.4	11.5	102.4	47.8	6.9	22.3	**278.2**	**48.6**	6.6	23.2	**263.3**	**67.3**	**0.52**
Switzerland	1.0	4.3	8.6	12.8	1.1	5.4	**8.2**	**12.8**	0.6	4.4	0.0	**22.2**	**0.80**
Taiwan	2.0	4.3	19.9	12.2	2.7	3.9	**21.2**	**12.2**	1.4	4.0	11.0	**21.1**	**0.53**
Thailand	7.5	-4.4	37.4	40.7	8.0	0.0	**34.3**	**40.9**	8.0	0.0	**20.0**	**60.0**	**0.53**
Turkey	5.9	-34.4	128.5	84.4	6.4	0.0	**97.5**	**84.1**	3.8	0.0	**62.5**	**114.4**	**0.53**
U. Kingdom	0.6	8.1	106.6	68.3	1.7	**24.9**	**151.4**	**69.2**	0.7	**23.7**	**108.9**	**101.4**	**0.52**
United States	0.4	16.8	136.7	80.4	**0.5**	**20.8**	**210.7**	**81.4**	**0.5**	**18.9**	**147.8**	**144.1**	**0.65**
Venezuela	2.1	5.2	-1.8	12.4	2.3	3.7	0.0	**12.1**	0.0	0.0	0.0	**18.1**	**0.54**
Mean	3.4	7.0	37.0	39.7	4.1	13.3	45.6	39.3	2.7	12.7	25.3	62.0	0.63
Median	2.0	5.4	22.3	29.0	2.2	6.7	26.1	27.7	1.4	5.6	4.2	60.0	0.66

Based on unnormalized data. Figures that are significantly different from 0 at the 5% level are shown in **bold**. Significance tests are not available for technique 1.

TABLE 8: VARIANCE DECOMPOSITION RESULTS: PERCENT OF TOTAL VARIANCE

	1. Quadratic-form				2. Max. Likelihood				3. Max. Likelihood + AR(1)				
Country	Year	Ind	Firm	Trans	Year	Ind	Firm	Trans	Year	Ind	Firm	Trans	ρ
Argentina	1.7	20.8	-2.0	79.5	2.1	19.9	0.0	**78.0**	0.0	0.0	0.0	**100.0**	**0.61**
Austria	0.1	9.6	51.9	38.3	0.1	27.2	**42.2**	**30.5**	0.3	21.1	18.5	**60.1**	**0.72**
Belgium	6.2	2.5	64.7	26.6	7.1	11.6	**54.0**	**27.3**	3.2	10.6	37.6	**48.7**	**0.73**
Brazil	8.3	8.4	16.6	66.6	9.1	2.4	**23.1**	**65.3**	8.5	3.5	8.7	**79.3**	**0.44**
Canada	1.2	8.8	51.2	38.7	0.7	**10.2**	**65.7**	**23.4**	0.7	**10.0**	**59.1**	**30.2**	**0.44**
Chile	9.4	6.2	45.4	38.9	13.2	5.2	**42.2**	**39.4**	8.8	2.5	15.0	**73.7**	**0.72**
China	14.0	0.7	32.4	52.8	14.9	2.7	**33.0**	**49.4**	9.6	1.0	0.0	**89.4**	**0.66**
Colombia	23.9	31.9	12.6	31.5	25.6	16.8	27.5	**30.1**	7.4	6.1	0.0	**86.5**	**0.80**
Denmark	2.7	15.8	38.6	42.9	2.7	13.6	**47.2**	**36.5**	1.0	18.0	9.2	**71.7**	**0.70**
Finland	12.2	-6.9	51.8	42.8	16.2	7.3	**37.8**	**38.7**	13.5	5.0	0.0	**81.6**	**0.72**
France	5.0	2.4	51.3	41.3	5.0	3.1	**54.1**	**37.8**	3.4	3.0	10.0	**83.7**	**0.79**
Germany	1.3	10.1	52.2	36.5	1.1	**9.0**	**57.5**	**32.4**	0.8	**9.1**	**43.0**	**47.1**	**0.59**
Greece	10.4	6.5	48.0	35.1	15.5	8.0	**44.7**	**31.8**	6.4	8.5	3.7	**81.4**	**0.76**
Hong Kong	6.0	4.8	45.8	43.4	6.4	4.5	**48.5**	**40.6**	6.8	4.1	0.0	**89.1**	**0.71**
Hungary	-0.5	-6.0	71.6	34.9	0.0	11.1	53.0	**35.9**	0.7	10.7	0.0	**88.6**	**0.78**
India	2.5	9.6	49.2	38.7	3.1	10.0	**49.8**	**37.2**	2.8	9.1	**22.5**	**65.6**	**0.66**
Indonesia	4.3	15.2	40.0	40.6	4.4	**18.4**	**38.4**	**38.7**	3.4	12.7	0.0	**84.0**	**0.72**
Ireland	-3.9	62.7	-7.6	48.7	0.0	71.3	0.0	**28.7**	0.1	66.0	0.0	**33.9**	**0.63**
Israel	7.2	12.7	50.5	29.6	7.6	0.0	**62.2**	**30.1**	6.1	0.0	33.8	60.1	**0.67**
Italy	1.9	17.0	49.2	31.8	1.5	36.5	**39.2**	**22.8**	0.5	26.8	0.0	**72.7**	**0.85**
Japan	8.2	6.0	46.6	39.2	7.3	**8.9**	**46.9**	**37.0**	**6.7**	**8.9**	**19.7**	**64.8**	**0.78**
Malaysia	3.0	15.4	40.3	41.4	2.3	**16.0**	**41.2**	**40.5**	2.3	**13.6**	0.0	**84.1**	**0.73**
Mexico	1.3	-16.1	73.6	41.3	0.7	0.0	**70.0**	**29.3**	0.0	0.0	0.0	**100.0**	**0.88**
Netherlands	1.5	23.1	50.2	25.3	1.4	15.7	**60.4**	**22.5**	1.1	22.3	14.2	**62.3**	**0.78**
New Zealand	1.8	24.6	29.0	44.7	1.8	**23.6**	**29.2**	**45.4**	1.5	**23.7**	**23.0**	**51.8**	**0.23**
Norway	1.0	29.3	16.4	53.3	0.7	**50.2**	**12.1**	**37.0**	0.6	**50.8**	5.8	**42.9**	**0.37**
Pakistan	4.0	9.2	37.3	49.5	3.7	8.5	**38.2**	**49.6**	2.5	8.7	0.0	**88.8**	**0.73**
Peru	7.7	-33.6	79.2	46.7	9.0	0.0	**47.3**	**43.8**	9.2	0.0	34.5	**56.3**	**0.45**
Philippines	1.8	22.0	12.8	63.4	3.4	**21.5**	**14.0**	**61.0**	2.1	**21.6**	5.8	**70.5**	**0.27**
Poland	10.1	5.8	44.5	39.6	13.3	7.8	39.1	**39.8**	7.9	5.7	0.0	**86.4**	**0.71**
Portugal	0.3	-39.9	91.8	47.8	0.3	0.0	**63.6**	**36.2**	0.2	0.0	**51.3**	**48.5**	**0.47**
S. Korea	2.0	9.4	36.0	52.7	1.9	**9.8**	**37.1**	**51.2**	1.3	**8.2**	5.1	**85.4**	**0.66**
Singapore	2.6	3.3	4.8	89.4	1.8	3.2	**8.7**	**86.3**	1.2	3.9	0.0	**94.9**	**0.37**
South Africa	1.7	11.6	59.1	27.5	1.5	13.7	**53.3**	**31.4**	0.6	12.8	24.5	**62.1**	**0.68**
Spain	4.3	5.8	42.3	47.6	4.4	0.0	**49.9**	**45.7**	3.4	0.0	**28.0**	**68.5**	**0.60**
Sweden	3.8	6.8	60.9	28.4	1.9	6.3	**78.2**	**13.7**	1.8	6.4	**73.0**	**18.7**	**0.52**
Switzerland	3.8	16.1	32.2	47.8	3.9	19.7	**29.8**	**46.6**	2.1	16.2	0.0	**81.7**	**0.80**
Taiwan	5.3	11.2	51.9	31.6	6.7	9.7	**53.0**	**30.5**	3.7	10.7	29.3	**56.3**	**0.53**
Thailand	9.2	-5.4	46.1	50.1	9.6	0.0	**41.2**	**49.2**	9.0	0.0	**22.8**	**68.2**	**0.53**
Turkey	3.2	-18.7	69.7	45.8	3.4	0.0	**51.9**	**44.7**	2.1	0.0	**34.6**	**63.3**	**0.53**
U. Kingdom	0.3	4.4	58.1	37.2	0.7	**10.1**	**61.3**	**28.0**	0.3	**10.1**	**46.4**	**43.2**	**0.52**
United States	0.3	4.4	58.1	37.2	**0.1**	**6.6**	**67.2**	**26.0**	**0.2**	**6.1**	**47.5**	**46.3**	**0.65**
Venezuela	11.9	29.1	-10.0	69.0	12.7	20.4	0.0	**66.9**	0.1	0.0	0.0	**99.9**	**0.54**
Mean	4.7	8.3	42.9	44.1	5.3	12.6	42.2	39.9	3.3	10.6	16.9	69.1	0.63
Median	3.2	8.8	46.6	41.3	3.4	9.7	44.7	37.2	2.1	8.5	9.2	70.5	0.66

Based on unnormalized data. Figures that are significantly different from 0 at the 5% level are shown in **bold**. Significance tests are not available for technique 1.

TABLE 9: CROSS-COUNTRY CORRELATION IN VARIANCE COMPONENTS FOR DIFFERENT DECOMPOSITION TECHNIQUES

	Variance component for year effects ($\sigma_{\gamma k}^2$)					Variance component for industry effects ($\sigma_{\alpha k}^2$)				
	1	2	3	4	5	1	2	3	4	5
Unnormalized data:										
1. Quadratic-form										
2. Maximum likelihood	**0.97**					**0.74**				
3. Max. likelihood with AR(1)	**0.74**	**0.77**				**0.71**	**0.99**			
Normalized data:										
4. Quadratic-form	**0.81**	**0.80**	**0.51**			**0.84**	**0.58**	**0.54**		
5. Maximum likelihood	**0.78**	**0.81**	**0.53**	**0.98**		**0.71**	**0.82**	**0.79**	**0.78**	
6. Max. likelihood with AR(1)	**0.58**	**0.61**	**0.67**	**0.75**	**0.80**	**0.64**	**0.78**	**0.80**	**0.63**	**0.88**

	Variance component for firm effects ($\sigma_{\delta k}^2$)					Variance component for errors ($\sigma_{\varepsilon k}^2$)				
	1	2	3	4	5	1	2	3	4	5
Unnormalized data:										
1. Quadratic-form										
2. Maximum likelihood	**0.82**					**1.00**				
3. Max. likelihood with AR(1)	**0.72**	**0.97**				**0.95**	**0.95**			
Normalized data:										
4. Quadratic-form	**0.54**	*0.28*	0.18			-0.06	-0.05	-0.14		
5. Maximum likelihood	**0.47**	**0.45**	*0.34*	**0.84**		-0.06	-0.05	-0.14	**0.99**	
6. Max. likelihood with AR(1)	**0.45**	**0.44**	**0.51**	**0.49**	**0.42**	0.04	0.05	0.15	**0.46**	**0.50**

Based on results shown in Table 7. **Bold** figures are statistically significant at the 1% level. *Italicized* figures are statistically significant at the 10% level.

TABLE 10: RELATIVE SIZE OF FIRM, INDUSTRY, AND YEAR VARIANCE COMPONENTS

	1. Quadratic-form	2. Max. likelihood	3. Max. likelihood with AR(1)
Firm ≥ Industry	37 countries	38 countries	22 countries
Industry ≥ Year	28	27	28
Firm ≥ Year	39	41	28
Firm ≥ Industry ≥ Year	22	22	12
Firm ≥ Year > Industry	15	16	9
Industry > Firm ≥ Year	2	3	7
Industry ≥ Year > Firm	4	2	9
Year > Firm ≥ Industry	0	0	1
Year > Industry > Firm	0	0	5

Based on unnormalized data, results shown in Table 7.

TABLE 11: BIVARIATE CORRELATIONS BETWEEN VARDISTANCE AND NATIONAL CHARACTERISTICS

	Expected sign	Unnormalized data: Quadratic-form	Unnormalized data: Max. Likelihood	Unnormalized data: ML w/ AR(1)	Normalized data: Quadratic-form	Normalized data: Max. Likelihood	Normalized data: ML w/ AR(1)
NatSim							
ΔGDP	+		--				
ΔEducate	+						
ΔPhone	+				++	+++	
ΔTech	+		--		++++	+++	
SameCivil	-						
ΔRuleOfLaw	+				++++	+++	
ΔCurrency	+	--	---	---			
ΔTrade	+						
ΔGovShare	+	+++	+++	+++	++		++++
ΔBlackMkt	+						
ΔClean	+				++	+++	
Distance	+						
SameZone	-						
SameLawOrig	-		--	---			
SameAcctOrig	-	+++	+++	+++			
AvgDev							
AvgGDP	-		+++	++	----		
AvgEducate	-	+++	++++	+++	---		
AvgPhone	-	++	++++	++++	----	--	
AvgTech	-		+++	+++	----	--	
AvgRuleOfLaw	-		+++	++++	----	--	
AvgCurrency	-		+++	++	---		
AvgTrade	-	---	--				
AvgGovShare	+		+++	++++			
AvgBlackMkt	+						
AvgClean	-		+++	+++	---		

Significance levels based on QAP.
++ or -- indicates sign plus significance at 10% level.
+++ or --- indicates sign plus significance at 5% level.
++++ or ---- indicates sign plus significance at 1% level.
Blank indicates insignificant correlation.

TABLE 12: RELATIONSHIPS BETWEEN VARDISTANCE AND FACTORS

	Expected sign	Unnormalized data			Normalized data		
		Quadratic-form	Max. Likelihood	ML w/ AR(1)	Quadratic-form	Max. Likelihood	ML w/ AR(1)
Bivariate							
Difference in development	+		--				
Physical & cultural proximity	-	---	--	--			
Difference in currency openness	+	---	----	----			
Average development	-	++	+++	++++	---	--	
Multivariate							
Difference in development	+		++	+++			
Physical & cultural proximity	-	---	---	---			
Difference in currency openness	+						
Average development	-	++	++++	++++	---	--	

Significance levels based on QAP.
++ or -- indicates sign plus significance at 10% level.
+++ or --- indicates sign plus significance at 5% level.
++++ or ---- indicates sign plus significance at 1% level.
Blank indicates insignificant relationship.

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